Wyoming Ambient Air Monitoring Annual Network Plan 2018

Clockwise: AQD employee Dan Sharon giving a tour of the Laramie Mobile station; the Jackson SLAMS station; the camera image from the Casper Mobile station during the 8/21/2017 Solar Eclipse; grizzly bear and cubs.

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Acronyms

AQD	Wyoming Department of Environmental Quality – Air Quality Division
AQRM	Air Quality Resource Management Program
AQRV	Air Quality Related Value
AQS	EPA's Air Quality System database
BAM	Beta Attenuation Monitor
CFR	United States Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
DRR	SO_2 Data Requirements Rule
EPA	United States Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
FR	Federal Register
IMPROVE	Interagency Monitoring of Protected Visual Environments
IWDW	Intermountain West Data Warehouse
LMP	Limited Maintenance Plan
MSA	Metropolitan Statistical Area
µg/m^3	Micrograms per cubic meter
µSA	Micropolitan Statistical Area
MOA	Memorandum of Agreement
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standard
NADP	National Atmospheric Deposition Program
NCore	National Core Multi-Pollutant Monitoring Station
NPAP	National Performance Audit Program
NMHC	Non-Methane Hydrocarbons
NMRF	Network Modification Request Form

NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NO_y	Reactive Oxides of Nitrogen
NPS	United States National Park Service
NSR	AQD's New Source Review Program
O_3	Ozone
ppb	Parts per billion
ppm	Parts per million
PM_{10}	Particulate Matter less than 10 micrometers in aerodynamic diameter
$PM_{2.5}$	Particulate Matter less than 2.5 micrometers in aerodynamic diameter
POC	Parameter Occurrence Code
PEP	Performance Evaluation Program
PPA	Performance Partnership Agreement
PRB	Powder River Basin
PSD	Prevention of Significant Deterioration
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
SLAMS	State and Local Air Monitoring Stations
SO_2	Sulfur Dioxide
SPM	Special Purpose Monitor
TEOM	Tapered element oscillating microbalance
THC	Total Hydrocarbons
TSA	Technical System Audit
UGRB	Upper Green River Basin (Portions of Lincoln and Sweetwater Counties and all of Sublette County)
UGWOS	Upper Green Winter Ozone Study
UV	Ultraviolet
VOC	Volatile Organic Compounds

VSCC	Very Sharp Cut Cyclone
WAAQS	Wyoming Ambient Air Quality Standards
WDEQ	The Wyoming Department of Environmental Quality
WyVisNet	The AQD's monitoring website, **http://www.wyvisnet.com**

Executive Summary

The Wyoming Department of Environmental Quality – Air Quality Division (AQD) presents the 2018 Annual Network Plan for ambient air and meteorological monitoring as required by Title 40 Part 58.10 of the Code of Federal Regulations (CFR). The 2018 Annual Network Plan summarizes the AQD's monitoring efforts in Wyoming to ensure full compliance with the National Ambient Air Quality Standards (NAAQS). Throughout this document, information is presented on the AQD's State and Local Air Monitoring Stations (SLAMS), Special Purpose Monitors (SPMs), other ambient monitoring that occurred in Wyoming throughout 2017 and future monitoring plans of the AQD. Complete data from ambient monitoring is provided from 2015-2017 for any monitoring station that operated during this 3-year period. Additionally, the AQD has updated information on monitors to comply with the SO_2 Data Requirements Rule (DRR) and industrial monitoring networks established through New Source Review (NSR) permitting requirements.

1.0 Introduction

The AQD presents its Annual Network Plan for 2018 to the United States Environmental Protection Agency (EPA) as required by Title 40, Part 58.10(a)(1) of the CFR. The 2018 Annual Network Plan provides a comprehensive review of the ambient monitoring stations maintained by the AQD. These stations are the SLAMS, SPMs, mobile stations that monitor for particulates and or gaseous pollutants, and the National Core Multi-Pollutant Monitoring Station (NCore). The 2018 Annual Network Plan illustrates how the AQD's ambient monitoring network satisfies the requirements of Title 40, Part 58 Appendices A, C, D, and E of the CFR.

1.1 The AQD's Ambient Monitoring History

Since the early 1970s, the AQD Monitoring Section has been committed to monitoring the air quality of Wyoming with the goal of protecting, conserving, and enhancing the quality of Wyoming's environment for the benefit of current and future generations. The Monitoring Section comprises one third of the Air Quality Resource Management (AQRM) Program, which provides the AQD with valuable information in order to determine future policy considerations. The other two components of the AQRM Program are the Emission Inventory Section and the Planning Section.

As mentioned in the Introduction, the AQD owns and operates different types of ambient monitoring stations: SLAMS, SPMs, mobile stations, and an NCore station. The SLAMS are sited in populated areas to monitor public health and demonstrate compliance with the NAAQS, but may serve other purposes such as:

- provide air pollution data to the general public in a timely manner
- support compliance with air quality standards and emissions strategy development
- support air pollution research studies

The SPM stations collectively have multiple objectives. These objectives include:

- monitoring public health
- investigating pollutant concentrations downwind of sources
- determining background pollutant concentrations

Since 2011, the AQD has operated a fleet of mobile monitoring stations to investigate questions or concerns about air quality on a short-term basis (typically one year). Additionally, the AQD operates an NCore station as part of the national network to evaluate long-term trends in air quality. The AQD also helps fund and evaluate data from Air Quality Related Value (AQRV) monitoring within Wyoming, such as visibility and acid deposition, as well as overseeing industrial monitoring required by air quality permits or the SO_2 DRR. Figure 1 shows the number of monitors the AQD runs or oversees from 1999 to May of 2018.

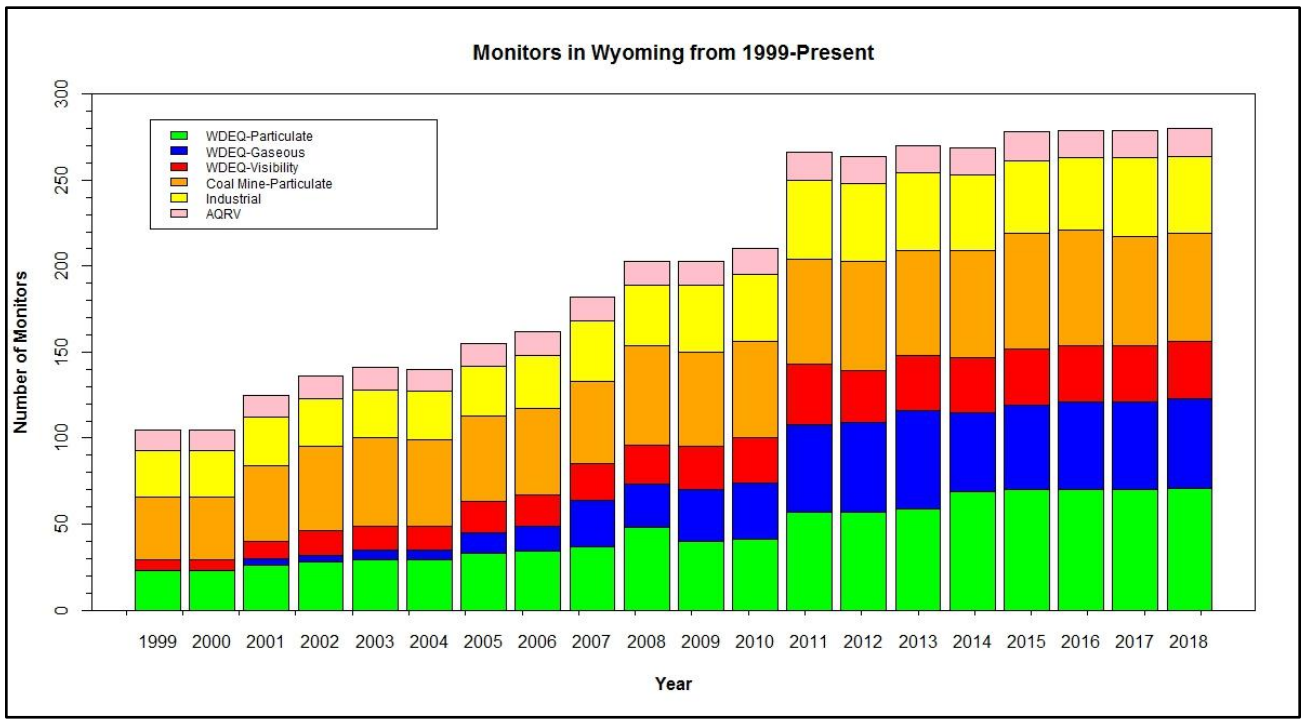


Figure 1. Number of Monitors in Wyoming from 1999-May 2018

1.2 General Monitoring Goals and Objectives

The AQD and Wyoming Department of Environmental Quality (WDEQ) are committed to protect, conserve, and enhance the quality of Wyoming's environment for the benefit of current and future generations. In order to maintain the ambient air quality in accordance with the NAAQS for the seven criteria pollutants, the AQD operates and maintains a network of ambient air quality monitors.

The Wyoming monitoring network, collectively, is designed to meet the following seven basic ambient air monitoring objectives:

1. Determine the representative concentrations in areas of high population density
2. Determine the impact on ambient air quality from significant sources
3. Determine the general background concentration levels
4. Determine the extent of regional pollutant transport among populated areas and in rural and remote areas
5. Determine welfare-related impacts in support of secondary standards
6. Determine the highest concentration expected to occur in the area covered by the network
7. Research pollutant and meteorological behaviors in areas of concern

It is important to acknowledge that not every individual monitor or monitoring station will meet all seven objectives, but the AQD's entire monitoring network will encompass and fulfill all of the objectives. Figure 2, below, is a map that shows the AQD's SLAMs, SPMs, and mobile monitoring

locations at the time of this publication. Following that is Table 1, which lists ambient monitoring stations and the parameters monitored at each station in 2017 and up to May 2018.

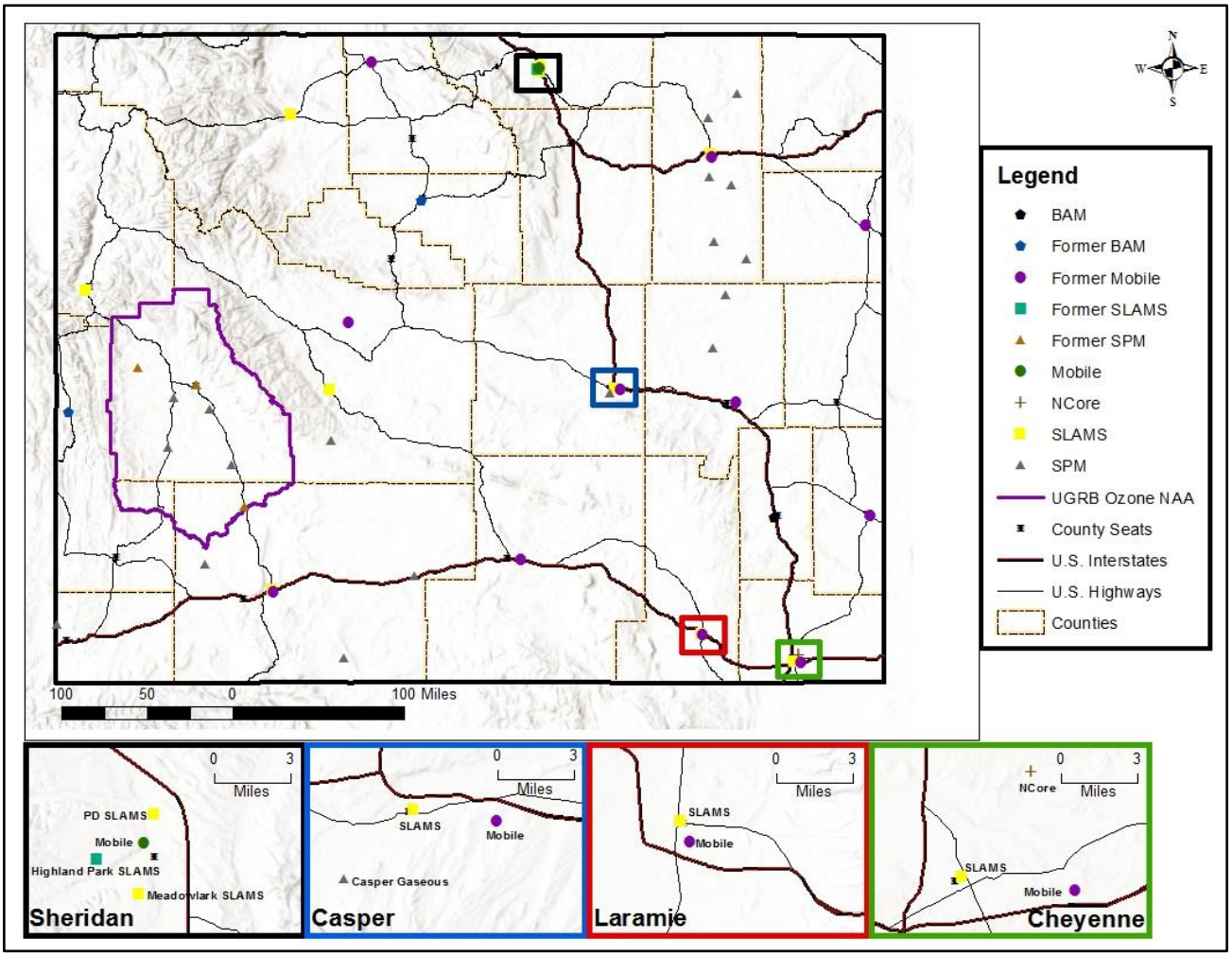


Figure 2. AQD Monitoring Site Locations (Past and Present)

NAME	COUNTY	PARAMETER										
		PM_{10} (manual)	PM_{10} (continuous)	$PM_{2.5}$ (manual)	$PM_{2.5}$ (continuous)	NO_x	O_3	SO_2	CO	Camera	Met	Other
Laramie SLAMS	Albany	X		X								
Laramie Mobile	Albany		X		X	X	X	X		X	X	CH_4/NMHC
Belle Ayr BA-4	Campbell				X	X						
Black Thunder BTM-36-2	Campbell				X							
Buckskin Mine	Campbell				X							
Campbell County	Campbell		X			X	X			X	X	
Gillette SLAMS	Campbell	X										
Thunder Basin	Campbell					X	X			X	X	Visibility
Wright Jr-Sr High School	Campbell	X										
Antelope Site 7	Converse				X	X						
Converse County	Converse		X			X	X		Trace	X	X	CH_4/NMHC
Lander SLAMS	Fremont	X		X								
South Pass	Fremont				X	X	X			X	X	
Cheyenne SLAMS	Laramie	X		X								
Cheyenne NCore	Laramie		X	X	X	X	X	Trace	Trace	X	X	NO/NO_y, $PM_{10-2.5}$, Speciated $PM_{2.5}$
Casper SLAMS	Natrona	X		X								
Casper Gaseous	Natrona					X	X			X	X	
Casper Mobile	Natrona		X		X	X	X	X		X	X	CH_4/NMHC
Cody SLAMS	Park	X		X								
Wheatland BAM Station	Platte		X		X						X	
Sheridan Meadowlark SLAMS	Sheridan	X		X								
Sheridan Mobile	Sheridan		X		X	X	X	X		X	X	CH_4/NMHC
Sheridan Police Station SLAMS	Sheridan		X	X							X	
Big Piney	Sublette					X	X			X	X	
Boulder	Sublette		X			X	X			X	X	NO_y CH_4/NMHC, Photolytic NO_2
Daniel South	Sublette		X			X	X			X	X	
Juel Spring	Sublette					X	X			X	X	
Pinedale Gaseous	Sublette				X	X	X			X	X	
Hiawatha	Sweetwater						X			X	X	
Moxa Arch	Sweetwater		X			X	X	X		X	X	
Rock Springs SLAMS	Sweetwater	X		X								
Wamsutter	Sweetwater		X			X	X			X	X	CH_4/NMHC
Jackson SLAMS	Teton	X		X								
Murphy Ridge	Uinta	X				X	X			X	X	

Table 1. Overview of Currently Operating Wyoming Monitors

1.3 Monitor Siting

The AQD decommissions, establishes, relocates, and modifies multiple monitoring stations every year. The AQD commits a large amount of resources to ensuring that these station modifications are executed in a timely manner and that new locations are scientifically justified to meet their specific objectives. The AQD also makes every effort to ensure that station modifications meet all applicable siting criteria in Title 40, Part 58, Appendix E of the CFR with the overall goal of securing the highest quality of data possible. Despite this commitment and dedication, monitor siting can often be a lengthy process rife with concessions to practical considerations. A brief, incomplete list of siting considerations that the AQD routinely encounters that may affect the ultimate location, timing, and representativeness of monitoring station siting is provided below:

- Contract/land leasing negotiations
- Power availability/installation
- Site access (year-round)
- Land ownership
- Obstructions (trees, buildings)
- Complex terrain
- Local ordinances/restrictions

2.0 Air Monitoring Plan in 2018

2.1 SLAMS

The SLAMS are used for supplying general monitoring data for criteria pollutants and determining compliance with the NAAQS. These are long-term stations that must meet and follow specific quality assurance, monitoring methodology, sampling objectives and siting requirements. The AQD SLAMS are located in Wyoming's most populous towns with the purpose of determining compliance with the NAAQS for the protection of public health. The 11 stations specified as Wyoming SLAMS locations are described below. Each description includes a satellite view of the SLAMS in the town or city with a photograph of the site, a table with site and monitor information, and a graph of annual means of PM_{10} and, if measured at the site, $PM_{2.5}$. Below is a map of SLAMS.

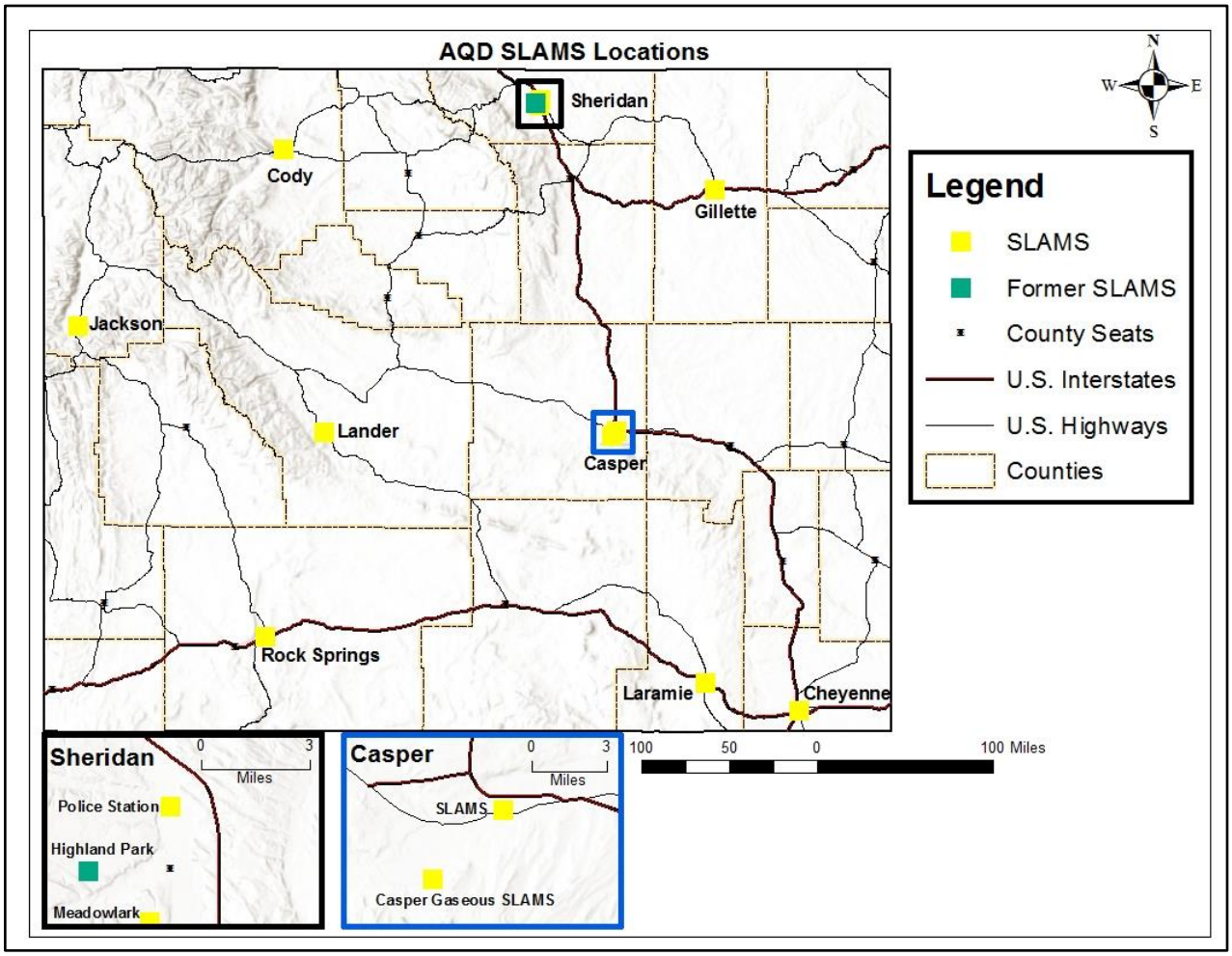


Figure 3. Map of SLAMS Locations

2.1.1 Casper Gaseous SLAMS

Figure 4. Casper Gaseous SLAMS satellite view and monitor photo (inset)

Casper Gaseous Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Casper Gaseous	2800 Pheasant Dr.	56-025-0100	O_3	Teledyne-API Model T400E	Neighborhood/Urban	Hourly	Changed from SPM to SLAMS on 1/1/2018
			$NO/NO_2/NO_x$	Teledyne-API Model T200E	Neighborhood	Hourly	No planned changes

Table 2. Casper Gaseous Monitor Information

The Casper Gaseous station began operations in March 2013. This station was sited to monitor population-based ozone concentrations in Wyoming's second largest city, a metropolitan

statistical area (MSA). This siting fulfilled a finding in the 2010 Network Assessment regarding the need for population-based ozone monitoring in Casper, WY. The Casper Gaseous station monitors O_3, NO_x, meteorology, and visibility (via a camera system).

As a result of the 2016 TSA's minor findings, EPA Region VIII recommended that the AQD submit a request to redesignate the Casper Gaseous ozone monitor type from SPM to SLAMS. The finding was based on the 3-year (2014-2016) ozone design value of 0.060 ppm for the Casper MSA which meets the SLAMS minimum ozone monitoring requirements found in Title 40, Part 58, Appendix D of the CFR.

The AQD submitted the Network Modification Request Form (NMRF) for approval on December 14, 2016. EPA Region VIII concurred with the AQD's NMRF on December 6, 2017. The Casper ozone monitor redesignation from SPM to SLAMS was modified in the EPA's Air Quality System (AQS) database on January 1, 2018. The original correspondence from the AQD to EPA on this is included in **Appendix C**. The response from EPA Region VIII is included in **Appendix D**.

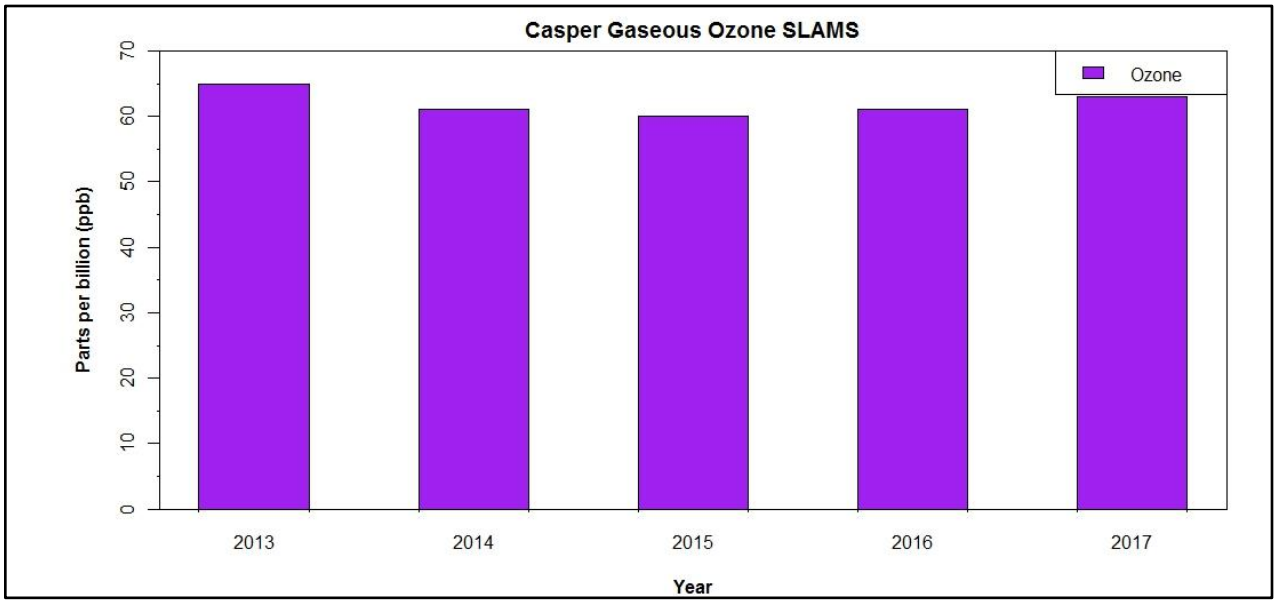


Figure 5. Casper Gaseous Ozone 8-hr. Annual 4th High

2.1.2 Casper SLAMS

Figure 6. Casper SLAMS satellite view and monitor photo (inset)

Casper – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Casper SLAMS	City, County Bldg.; Center & C Streets (Casper MSA)	56-025-0001	PM_{10}	R&P Co. Partisol Model 2000 (Manual filter-based)	Neighborhood	1 in 3 days (primary); 1 in 12 days (collocate)	Change Partisol 2000 to Partisol 2000i in 2018
			$PM_{2.5}$	R&P Co. Partisol Model 2000 $PM_{2.5}$ Air Sampler w/ VSCC (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	Change Partisol 2000 to Partisol 2000i in 2018

Table 3. Casper SLAMS Monitor Information

This station is located in downtown Casper, a city and MSA of over 59,000 people. Casper is the second largest city in Wyoming, located in Natrona County near the center of Wyoming. Data collection for PM_{10} began at this station in 1991. A collocated PM_{10} sampler was added in 2001 and the hi-volume PM_{10} samplers were replaced with low-volume partisols in 2010. The AQD enhanced the station by adding $PM_{2.5}$ sampling on May 22, 2009 as the population of Casper increased. In 2018, the AQD plans to replace the older Partisol 2000 samplers with Partisol 2000i samplers for both PM_{10} and $PM_{2.5}$.

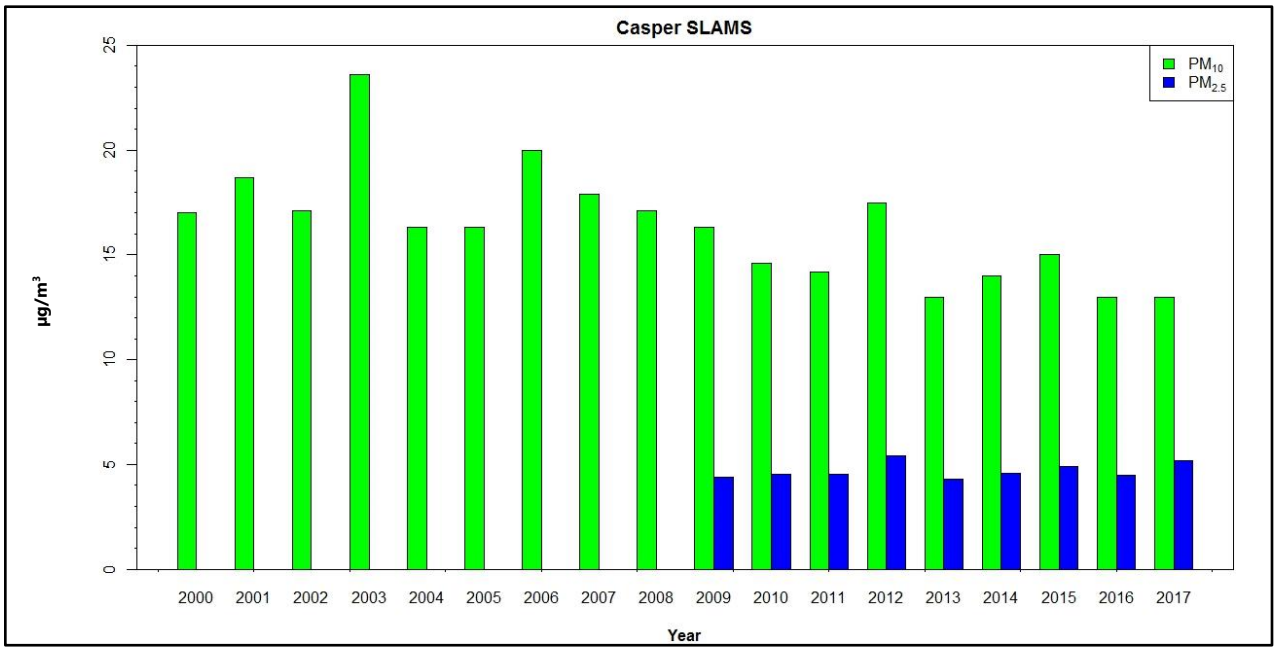


Figure 7. Casper SLAMS Annual Means

2.1.3 Cheyenne SLAMS

Figure 8. Cheyenne SLAMS satellite view and monitor photo (inset)

Cheyenne – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Cheyenne SLAMS	Emerson Bldg.; 23rd & Central Ave. (Cheyenne MSA)	56-021-0001	PM_{10}	R&P Co. Partisol Model 2000i (Manual filter-based)	Neighborhood	1 in 3 days (primary); 1 in 12 days (collocate)	No planned changes
			$PM_{2.5}$	R&P Co. Partisol Model 2000i $PM_{2.5}$ Air Sampler w/ VSCC (Manual filter-based)	Neighborhood	1 in 3 days (primary); 1 in 12 days (collocate)	No planned changes

Table 4. Cheyenne SLAMS Monitor Information

The Cheyenne monitoring station is located in downtown Cheyenne on the roof of the Emerson Building; a State of Wyoming owned building. Cheyenne is the capital and largest city of Wyoming with an approximate population of about 64,000. This population size leads to the classification of Cheyenne, WY as a MSA. The PM_{10} sampling started in 1991. A collocated PM_{10} sampler was added in 2002. The $PM_{2.5}$ monitors were added in 1998. A collocated $PM_{2.5}$ sampler was added in March 2009 to comply with Title 40 Part 58 requirements from the CFR for collocation of samplers. In 2017, the AQD replaced the older Partisol 2000 samplers with Partisol 2000i samplers.

The 2015 Network Assessment revealed a strong correlation of the PM_{10} and $PM_{2.5}$ data between the Cheyenne SLAMS and Cheyenne NCore station. The AQD plans to continue its evaluation of these data as discussed in the 2015 Network Assessment in order to optimize the network and avoid redundancies.

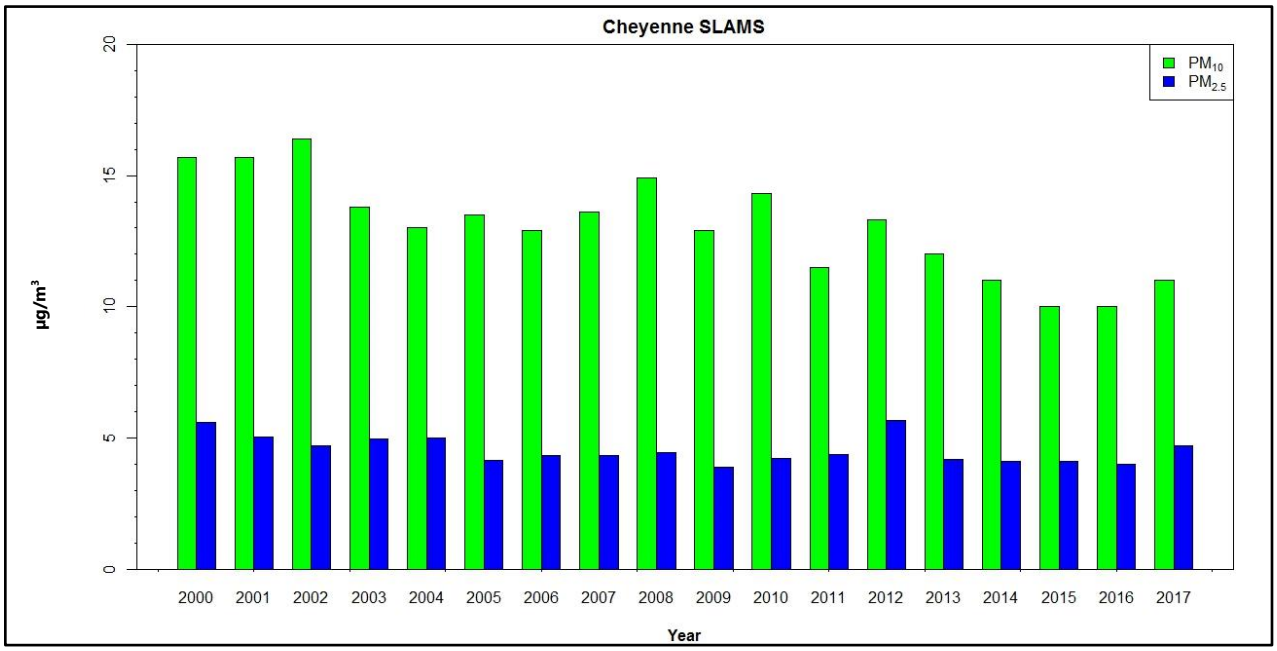


Figure 9. Cheyenne SLAMS Annual Means

2.1.4 Cody SLAMS

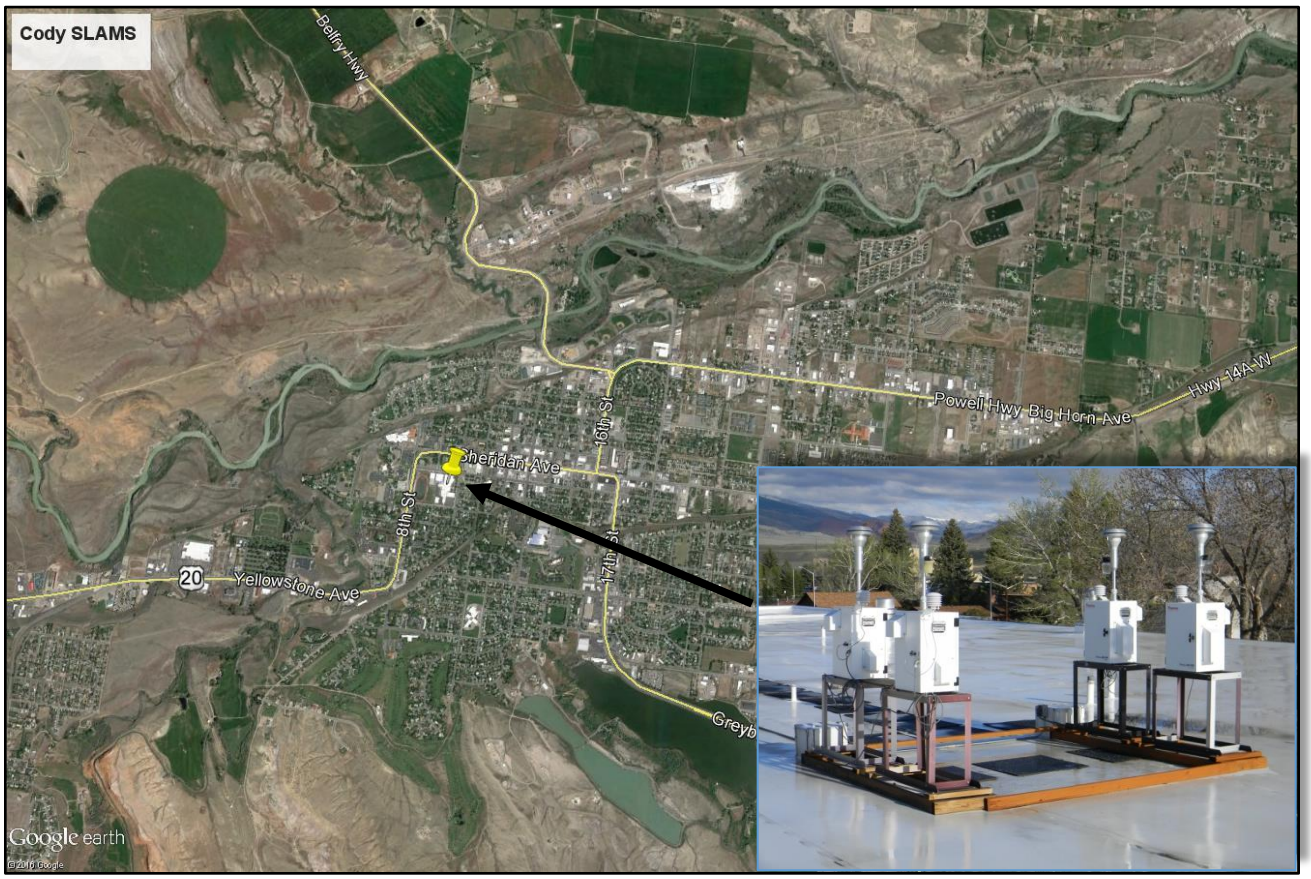


Figure 10. Cody SLAMS satellite view and monitor photo (inset)

Cody – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Cody SLAMS	1225 10th Street	56-029-0001	PM_{10}	R&P Co. Partisol Model 2000 (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	No planned changes
			$PM_{2.5}$	R&P Co. Partisol Model 2000 $PM_{2.5}$ Air Sampler w/ VSCC (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	No planned changes

Table 5. Cody SLAMS Monitor Information

Cody is located in the northwest portion of Wyoming in Park County. Its population is around 9,800. The AQD initiated PM_{10} sampling at this station in 1988. The PM_{10} samplers were upgraded to the current instrument seen in the table above during 2010. In June 2008, $PM_{2.5}$ monitoring began at the Cody SLAMS. The AQD started monitoring ambient $PM_{2.5}$ concentrations in Cody due to impacts from wintertime sanding, wood smoke, summertime wildfires, and the nearby lakebed that can be exposed at low water levels.

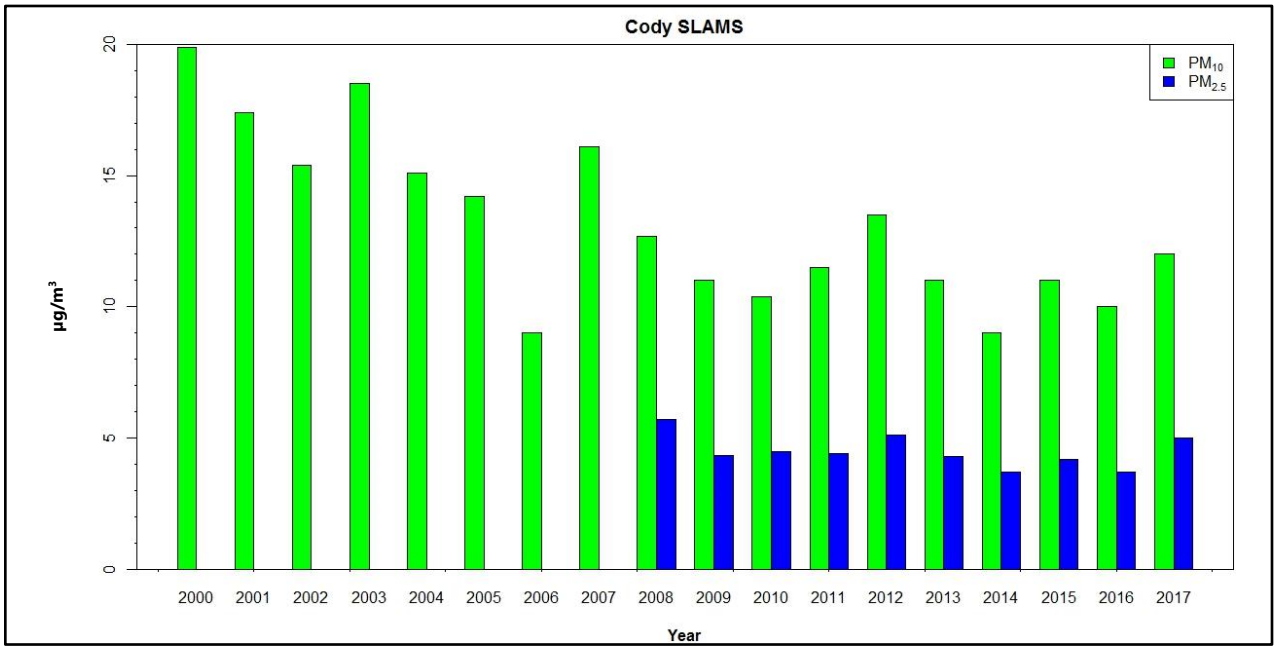


Figure 11. Cody SLAMS Annual Means

2.1.5 Gillette SLAMS

Figure 12. Gillette SLAMS satellite view and monitor photo (inset)

Gillette – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Gillette SLAMS	1000 W. 8th St.	56-005-1002	PM_{10}	R&P Co. Partisol Model 2000 (Manual filter-based)	Neighborhood	1 in 6 days	No planned changes

Table 6. Gillette SLAMS Monitor Information

Gillette is located in Campbell County, the northeastern part of Wyoming. Its population is approximately 32,000. The population size results in Gillette meeting the classification of micropolitan statistical area (μSA). The AQD has monitored PM_{10} at this location since 1991.

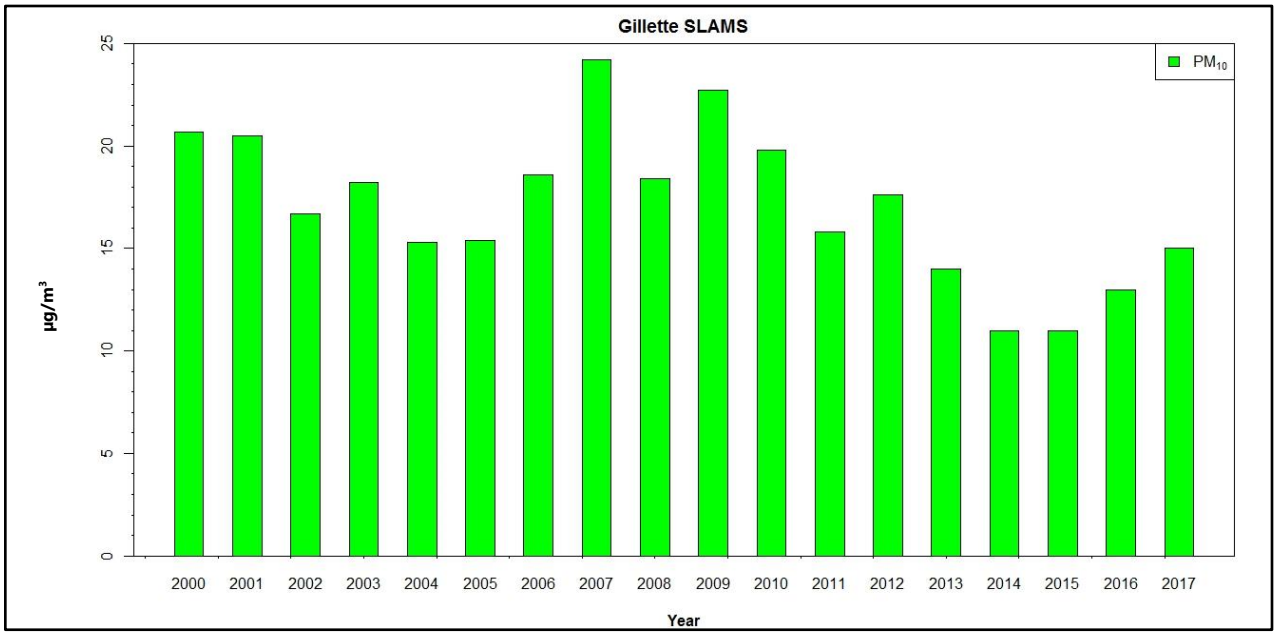


Figure 13. Gillette SLAMS Annual Means

2.1.6 Jackson SLAMS

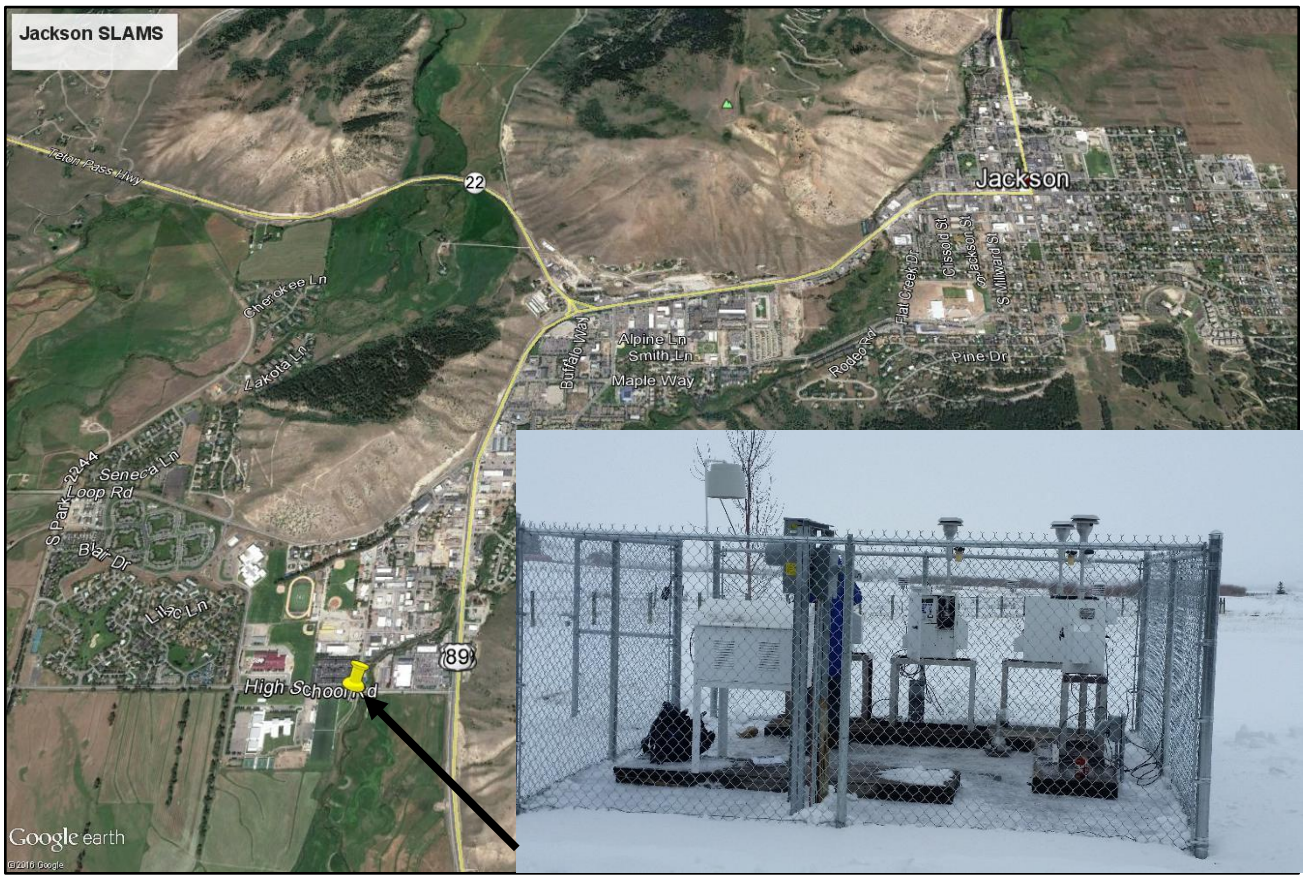


Figure 14. Jackson SLAMS satellite view and monitor photo (inset)

Jackson – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Jackson SLAMS	40 E. Pearl Ave.	56-039-1006	PM_{10}	R&P Co. Partisol Model 2000 (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	No planned changes
			$PM_{2.5}$	R&P Co. Partisol Model 2000 $PM_{2.5}$ Air Sampler w/ VSCC (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	No planned changes

Table 7. Jackson SLAMS Monitor Information

Jackson is located in Teton County in northwest Wyoming. Its population is just over 10,000 as of 2016. Due to its size, Jackson is considered a µSA.

PM_{10} and $PM_{2.5}$ sampling began in Jackson in 2001 at the Teton County Building site. The samplers were moved to the Jackson Fire Station site in June 2007. The AQD moved the samplers on December 21, 2016 to the Teton County Transfer Station near Jackson High School at the southwestern region of the town. The graph of annual means below only includes the Jackson Fire Station and the Teton County Transfer Station from 2007-2017.

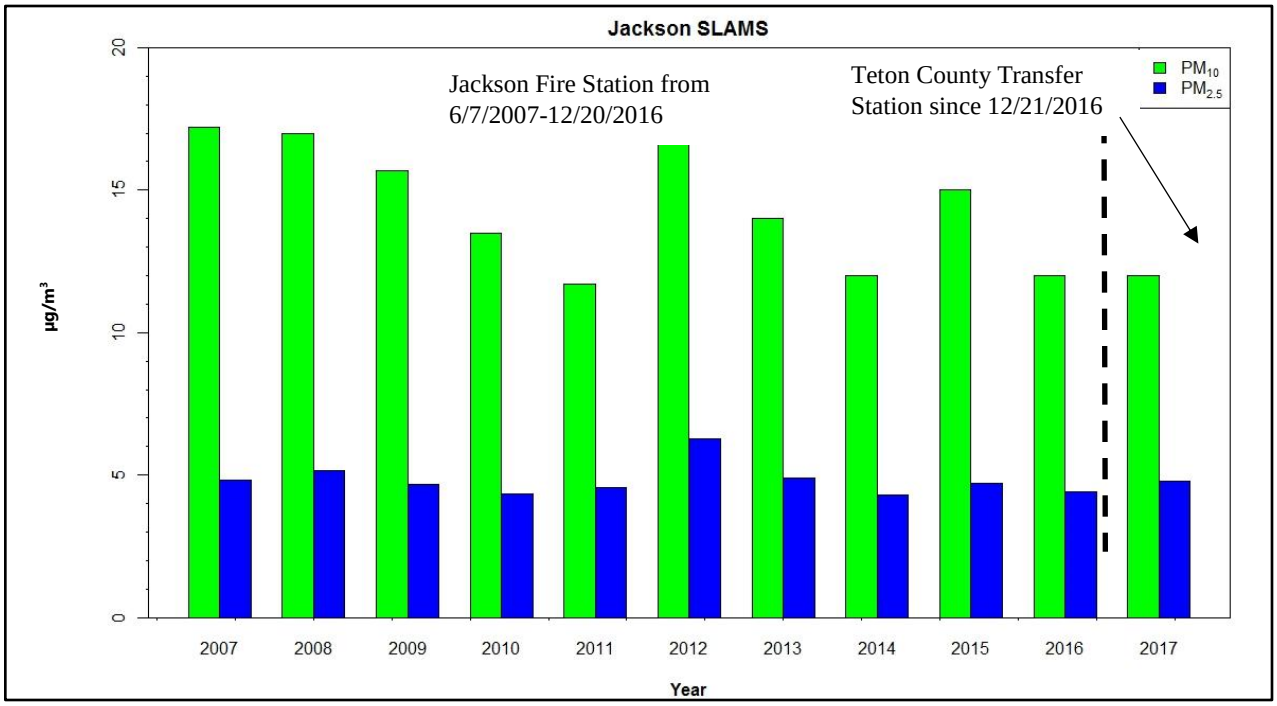


Figure 15. Jackson SLAMS Annual Means

2.1.7 Lander SLAMS

Figure 16. Lander SLAMS satellite view and monitor photo (inset)

Lander – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Lander SLAMS	600 Washington	56-013-1003	PM_{10}	R&P Co. Partisol Model 2000 (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	Change Partisol 2000 to Partisol 2000i in 2018
			$PM_{2.5}$	R&P Co. Partisol Model 2000 $PM_{2.5}$ Air Sampler w/ VSCC (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	Change Partisol 2000 to Partisol 2000i in 2018

Table 8. Lander SLAMS Monitor Information

The Lander SLAMS is located in Fremont County in the central part of the State. There is a population of just over 7,600 in Lander as of 2016. The AQD began PM_{10} sampling at this station in 1989. $PM_{2.5}$ monitors were installed at this location in 2001.

The AQD renovated the aging on-site sampler platform for easier and safer access for the site operator and AQD staff. The AQD completed this upgrade in July 2017.

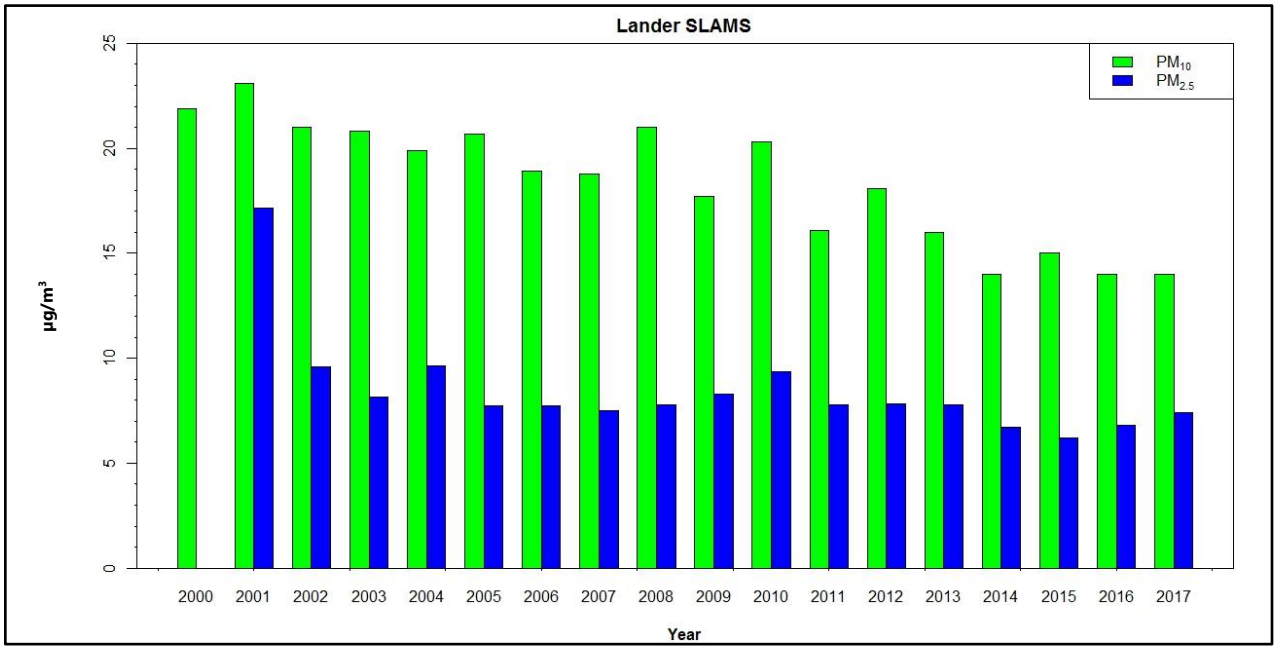


Figure 17. Lander SLAMS Annual Means

2.1.8 Laramie SLAMS

Figure 18. Laramie SLAMS satellite view and monitor photo (inset)

Laramie – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Laramie SLAMS	406 Ivinson	56-001-0006	PM_{10}	R&P Co. Partisol Model 2000 (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	No planned changes
			$PM_{2.5}$	R&P Co. Partisol Model 2000 $PM_{2.5}$ Air Sampler w/ VSCC (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	No planned changes

Table 9. Laramie SLAMS Monitor Information

Laramie is located in Albany County in the southeastern region of Wyoming. Laramie, one of Wyoming's larger populated areas at around 32,000 as of 2016, is classified as a µSA. In 1989, the AQD began PM_{10} sampling in Laramie. The AQD added $PM_{2.5}$ samplers to the Laramie SLAMS in July 2009 to monitor impacts from wintertime sanding, wood smoke, and forest fires in the summer. In the summer of 2018, the AQD plans to replace the older Partisol 2000 samplers with newer Partisol 2000i samplers.

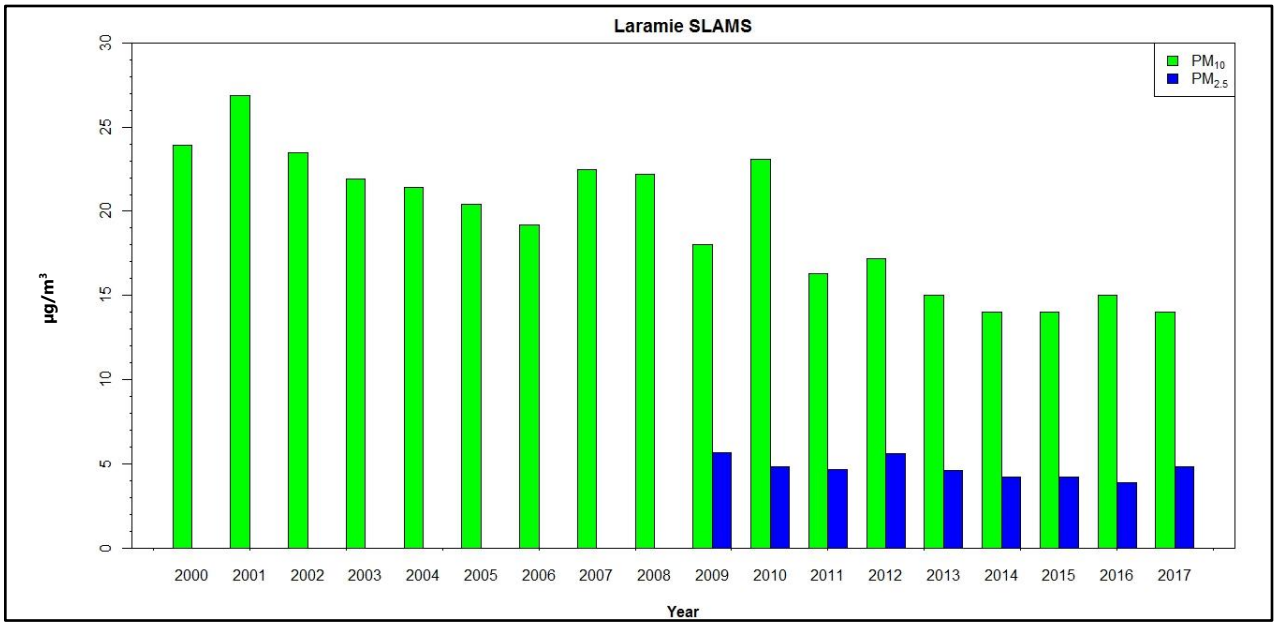


Figure 19. Laramie SLAMS Annual Means

2.1.9 Rock Springs SLAMS

Figure 20. Rock Springs SLAMS satellite view and monitor photo (inset)

Rock Springs – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Rock Springs SLAMS	625 Ahsay Ave.	56-037-0007	PM_{10}	R&P Co. Partisol Model 2000 (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	No planned changes
			$PM_{2.5}$	R&P Co. Partisol Model 2000 $PM_{2.5}$ Air Sampler w/ VSCC (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	No planned changes

Table 10. Rock Springs SLAMS Monitor Information

Rock Springs is located in the southwestern portion of the State in Sweetwater County. Rock Springs is a µSA with a population of over 23,000 from the 2016 census estimate. The AQD started sampling for PM_{10} at this SLAMS location in 1989. $PM_{2.5}$ monitors were added here in March 2008 due to a growth in population and energy development in the area.

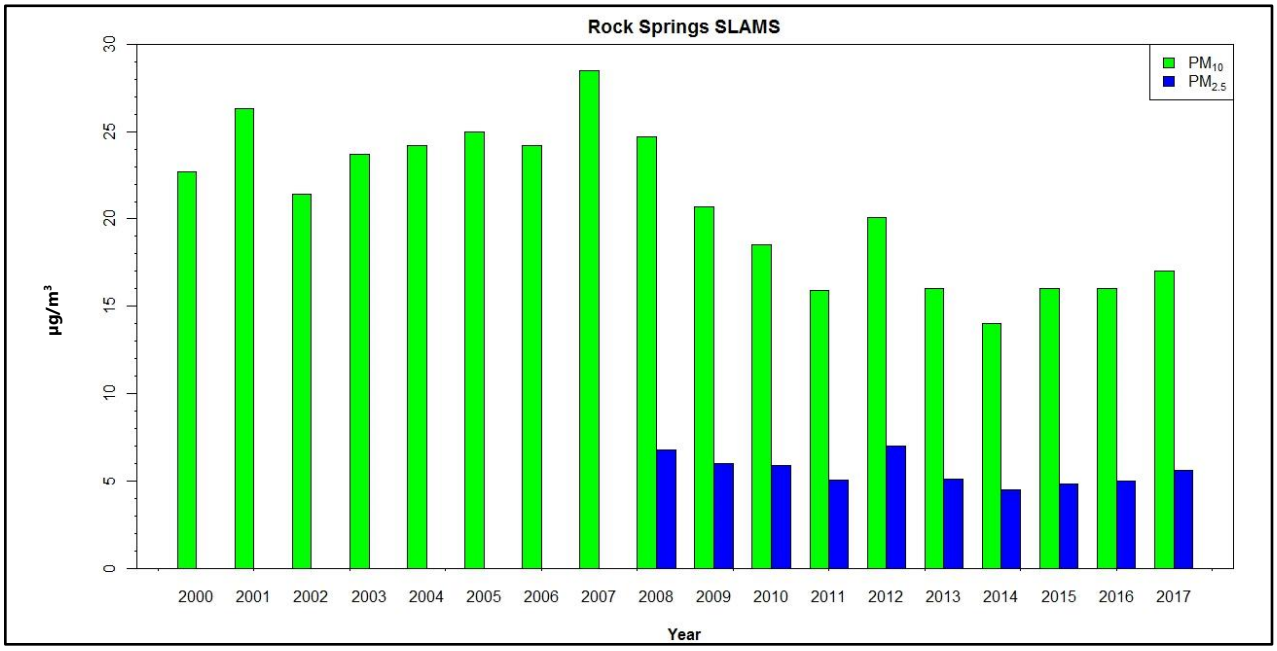


Figure 21. Rock Springs SLAMS Annual Means

2.1.10 Sheridan Meadowlark SLAMS

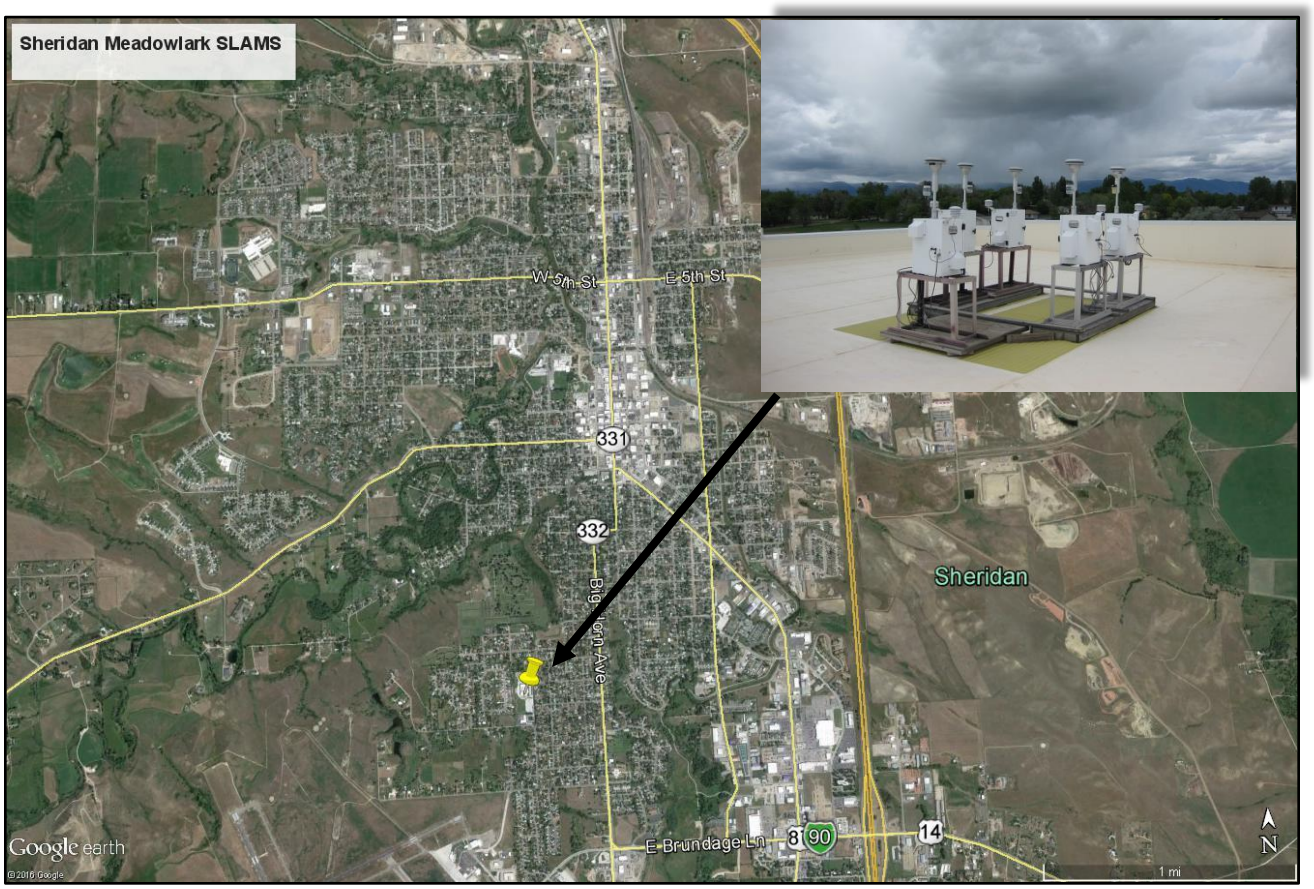


Figure 22. Sheridan Meadowlark SLAMS satellite view with monitor photo (inset)

Sheridan Meadowlark – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Sheridan Meadowlark SLAMS	1410 DeSmet Ave.	56-033-1003	PM_{10}	R&P Co. Partisol Model 2000 (Manual filter-based)	Neighborhood	1 in 3 days (primary); 1 in 12 days (collocate)	No planned changes
			$PM_{2.5}$	R&P Co. Partisol Model 2000 $PM_{2.5}$ Air Sampler w/ VSCC (Manual filter-based)	Neighborhood	1 in 3 days (offset between the primary & satellite samplers)	No planned changes

Table 11. Sheridan Meadowlark SLAMS Monitor Information

This monitoring location is one of two SLAMS in Sheridan, a µSA. Sheridan is located in north central Wyoming with a population of over 17,000. Wyoming's only nonattainment area (NAA) for PM_{10} was located within the city limits. The AQD has demonstrated to the EPA that the Sheridan PM_{10} NAA has attained the 1987 24-hour PM_{10} NAAQS for several years.

The EPA has approved the AQD's Limited Maintenance Plan (LMP) for the Sheridan moderate PM_{10} NAA, which was submitted to the EPA on June 2, 2017. The EPA promulgated final approval of the AQD's request for redesignation and LMP on April 4, 2018 and the redesignation from moderate NAA to attainment became effective on May 4, 2018 (**83 FR 14373**).

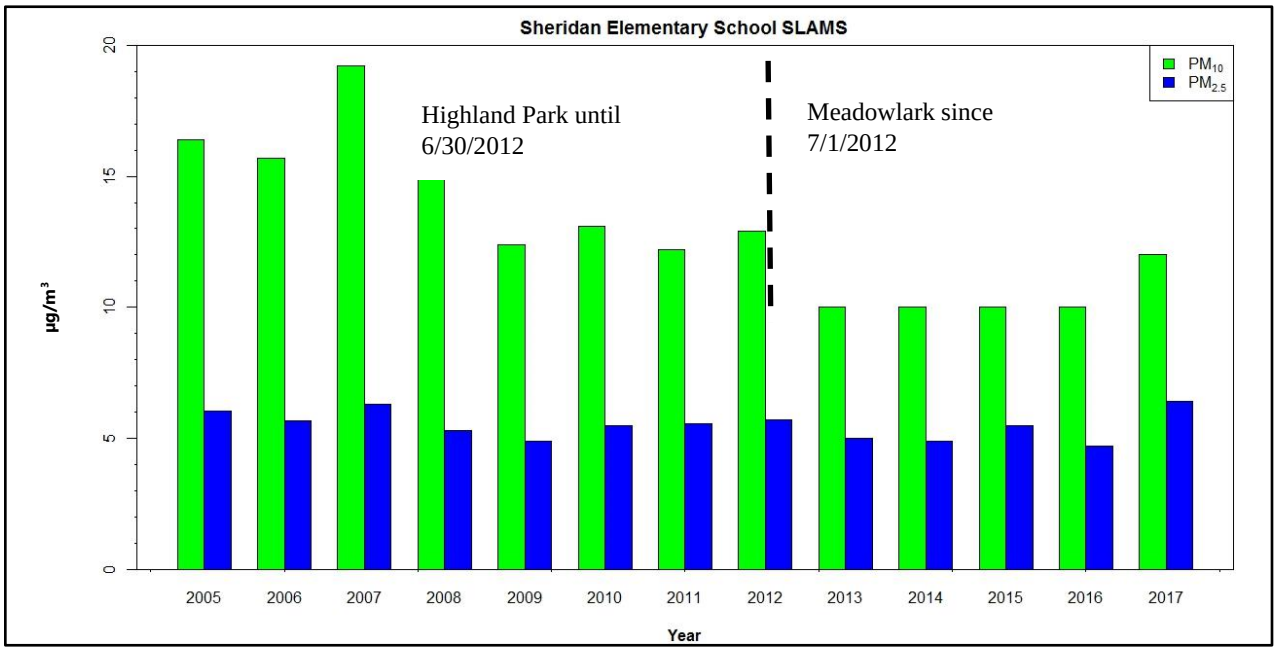


Figure 23. Sheridan Elementary SLAMS Annual Means

2.1.11 Sheridan Police Station SLAMS

Figure 24. Sheridan Police Station SLAMS satellite view and monitor photo (inset)

Sheridan Police Station – SLAMS Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Sheridan Police Station SLAMS	45 W. 12th St.	56-033-0002	PM_{10}	Continuous TEOM	Neighborhood	Hourly	No planned changes
			$PM_{2.5}$	R&P Co. Partisol Model 2000 $PM_{2.5}$ Air Sampler w/ VSCC (Manual filter-based)	Neighborhood	1 in 3 days (primary); 1 in 12 days (collocate)	No planned changes

Table 12. Sheridan Police Station SLAMS Monitor Information

The Sheridan Police Station SLAMS is one of the oldest monitoring stations in Wyoming. The monitoring objective for this station is to characterize the highest expected concentration of PM_{10} in the NAA. Filter-based PM_{10} sampling began at this station in 1985 but was replaced by a continuous tapered element oscillating microbalance (TEOM) sampler on October 1, 2007. $PM_{2.5}$ sampling at this station began in 1998. Meteorological instrumentation was added in 2008 to monitor local weather conditions that provided the AQD with better information for collaborating with the community to prevent PM_{10} exceedances. Please refer to **Section 2.1.10** for a discussion of the redesignation of the Sheridan PM_{10} NAA to attainment.

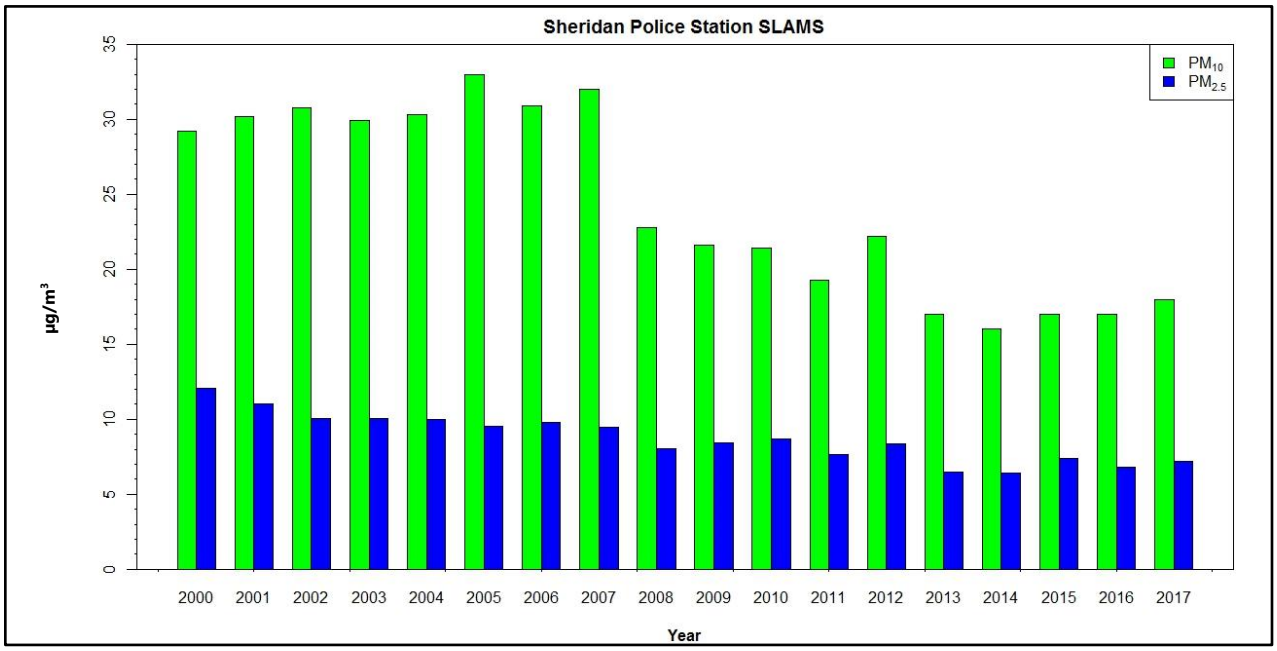


Figure 25. Sheridan Police Station SLAMS Annual Means

2.2 SPM Stations

The SPM stations, as mentioned in **Section 1.1**, have multiple objectives. The measurement of background and downwind pollutant concentrations, particularly with respect to public health, remain the main objectives for these stations. A description of each SPM station and its objective is provided along with a photo of the site and a table describing site and monitor information. A map of current SPM locations in Wyoming is provided below.

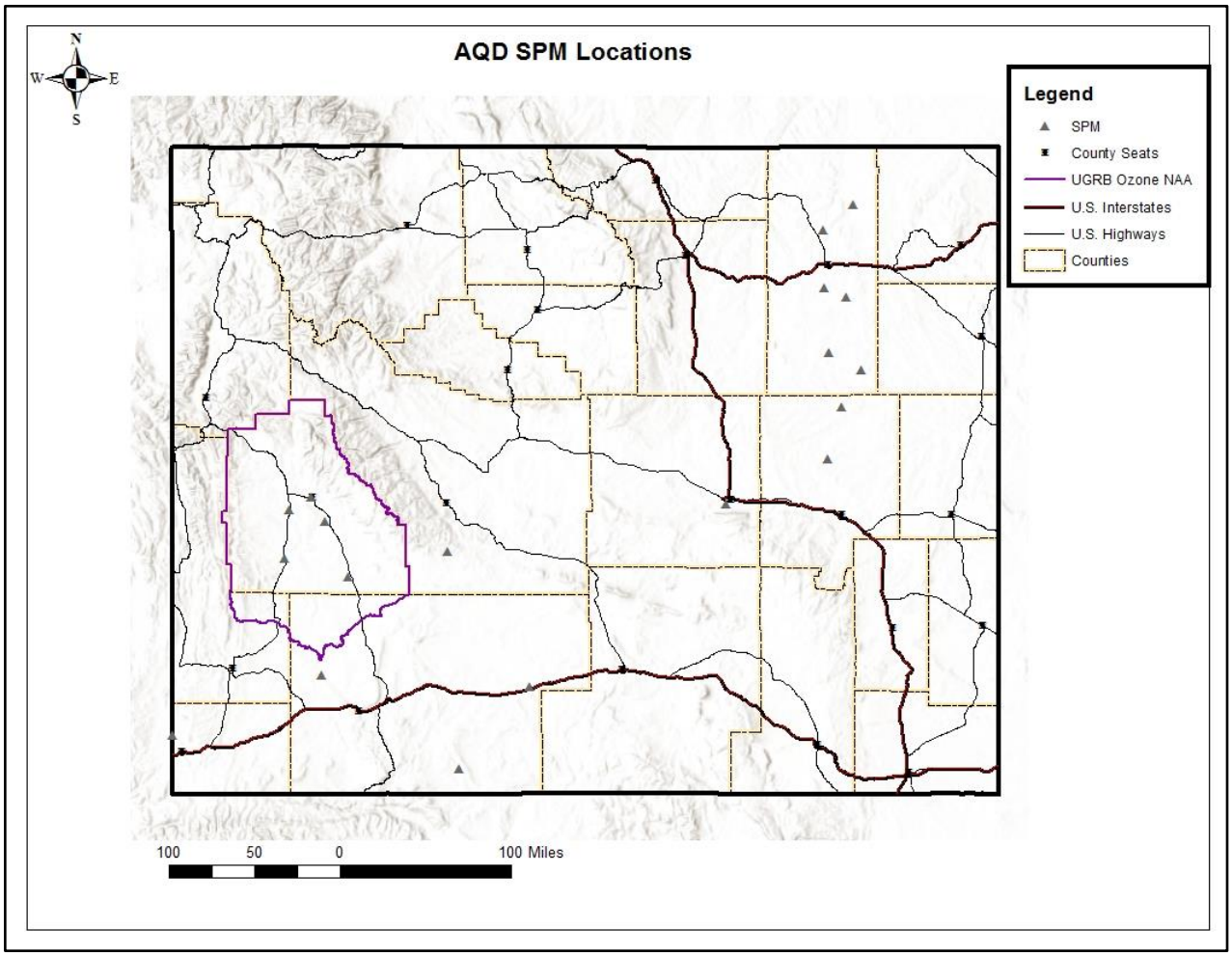


Figure 26. Map of current SPM locations

2.2.1 Big Piney

The Big Piney station is located four miles south of the Town of Big Piney. In March 2011, the AQD placed a mobile monitoring station at this location to monitor near the Big Piney and LaBarge Gas Fields. The mobile monitoring station equipment included a digital camera, ozone analyzer, oxides of nitrogen analyzer, methane/non-methane hydrocarbon (NMHC)/total hydrocarbon (THC) analyzer, continuous PM_{10} Beta Attenuation Monitor (BAM), $PM_{2.5}$ BAM monitor, and meteorological monitor. After two full years of operation, the AQD performed an assessment of the data from the Big Piney station and determined that it would be beneficial to continue monitoring some parameters at this location. On December 10, 2013, the long-term Big Piney station became operational. The station currently monitors ozone, oxides of nitrogen, meteorological parameters, and has a camera for visibility purposes. Since the station was kept in the same location, data from this station continues to be reported under AQS ID 56-035-0700.

Big Piney Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Big Piney	4 miles south of Big Piney, WY	56-035-0700	O_3	Thermo 49i	Regional	Hourly	No planned changes
			$NO/NO_2/NO_x$	Thermo Fisher Scientific Model 42i-TL	Regional	Hourly	No planned changes

Table 13. Big Piney Monitor Information

2.2.2 Boulder

The Boulder station is located approximately five miles southwest of Boulder, Wyoming and is used to track air quality in an area of natural gas development. The Boulder station's ozone monitor is also considered the "design value monitor" for the Upper Green River Basin (UGRB) Ozone NAA because Boulder had the highest ozone values in the UGRB and is used as the monitor to determine if the UGRB is attaining the ozone NAAQS.

The Boulder station began monitoring in February 2005, and includes gaseous (NO_x and ozone), continuous particulate (PM_{10} BAM), camera system and meteorological monitoring. The Boulder station was also a hub for the AQD's 2007 - 2016 Upper Green Winter Ozone Studies. Additionally, long-term monitoring has been added to the Boulder Station to better understand ozone formation in the Upper Green River Basin Ozone NAA. In 2018, this long-term monitoring included photolytic NO_2, methane/non-methane hydrocarbons, speciated VOC monitoring, NO_y monitoring, Ultraviolet (UV) radiometers, and upper air monitoring. In the summer of 2018, the AQD plans to add a ceilometer to the suite of upper air monitoring. The ceilometer will allow the AQD to better evaluate the height of inversions in the winter and the height of the boundary layer in the summer.

Boulder Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Boulder	5 miles southwest of Boulder, WY	56-035-0099	O_3	Teledyne-API Model 400 E	Neighborhood	Hourly	No planned changes
			$NO/NO_2/NO_x$	Teledyne-API Model 200E	Neighborhood	Hourly	No planned changes
			PM_{10}	Met One BAM 1020	Neighborhood	Hourly	No planned changes

Table 14. Boulder Monitor Information

2.2.3 Campbell County

The Campbell County station began operation in June 2003 and is located approximately 15 miles southwest of Gillette. This station is used to track air quality in an area of heavy coal-bed methane development. This station includes gaseous (NO_x and ozone), continuous particulate (PM_{10}), camera system and meteorological monitoring. The data analysis from the 2015 Network Assessment led to the determination that the Campbell County station has data from multiple pollutants which correlate well with sites owned by the AQD and by industry. Further analyses conducted in 2016 showed that this site may be decommissioned (**Appendix C of 2017 Network Plan**). The station will be decommissioned and relocated to eastern Johnson County in May 2018.

Campbell County Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Campbell County	15 miles SSW of Gillette, WY	56-005-0456	O_3	Thermo 49i	Regional	Hourly	Site to be decommissioned
			$NO/NO_2/NO_x$	Thermo Fisher Scientific Model 42i-TL	Regional	Hourly	Site to be decommissioned
			PM_{10}	Met One BAM 1020	Regional	Hourly	Site to be decommissioned

Table 15. Campbell County Monitor Information

2.2.4 Converse County

The Converse County station is located approximately 38 miles northwest of Douglas and is used to evaluate ambient air quality in an area of regional oil and gas development. Air quality measurements at the Converse County station include gaseous parameters (NO_x, ozone, carbon monoxide, and methane/non-methane hydrocarbons), continuous particulate (PM_{10} BAM), a camera system, and meteorological monitoring. The Converse County station began operation in April 2015. The data analysis from the 2015 Network Assessment identified additional monitoring needs in central Converse County. A carbon monoxide analyzer was added to this station on November 8, 2017 to fulfill one of these monitoring needs.

Converse County Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Converse County	16 miles west of WY Highway 59 on Highland Loop Rd.	56-009-0010	O_3	Teledyne-API Model T400	Regional	Hourly	No planned changes
			$NO/NO_2/NO_x$	Teledyne-API Model 200E	Regional	Hourly	No planned changes
			PM_{10}	Met One BAM 1020	Regional	Hourly	No planned changes
			CO	Teledyne-API 300EU2	Regional	Hourly	No planned changes

Table 16. Converse County Monitor Information

2.2.5 Daniel South

The Daniel South station is located approximately five miles south of the town of Daniel in Sublette County and is used to track air quality upwind of an area of extensive natural gas development. The Daniel South Station includes gaseous (NO_x and ozone), continuous particulate (PM_{10} BAM), camera system and meteorological monitoring. The Daniel South Station began operation in July 2005. Due to the age and progressive failure of the Teledyne 200E NO_x analyzer and the Teledyne T400E ozone analyzer, these instruments will both be replaced with newer models (Thermo 42i and Teledyne T400, respectively) in late May 2018.

Daniel South Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Daniel South	5 miles south of Daniel, WY	56-035-0100	O_3	Teledyne-API Model T400E	Regional	Hourly	Instrument will be replaced in 2018 by a Teledyne-API Model T400
			$NO/NO_2/NO_x$	Teledyne-API Model 200E	Regional	Hourly	Instrument will be replaced in 2018 by a Thermo Model 42i
			PM_{10}	Met One BAM 1020	Regional	Hourly	No planned changes

Table 17. Daniel South Monitor Information

2.2.6 Hiawatha

The Hiawatha station commenced operation on March 30, 2011. This station originated as a result of the 2010 Network Assessment where a need for background monitoring in an area of oil and gas development was discovered. The Hiawatha station is located about 45 miles directly southeast of Rock Springs, WY. Due to the remote location, the Hiawatha station is the AQD's first ambient monitoring station that uses solar and wind energy as its primary power source. Ozone is the only pollutant that is monitored at Hiawatha. Meteorological conditions and the visibility scene are also observed at this station. The Hiawatha station is a part of the Intermountain West Data Warehouse (IWDW) Project. Based on historical ozone data and resource considerations, a decision was made in May 2017 to cease collection of UV radiation data at Hiawatha.

Hiawatha Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Hiawatha	Bitter Creek Rd. 43 miles SE of Rock Springs, WY	56-037-0077	O_3	Teledyne-API Model 400E	Regional	Hourly	No planned changes

Table 18. Hiawatha Monitor Information

2.2.7 Juel Spring

The Juel Spring station began operation in December 2009 and is located approximately 15 miles downwind (southeast) of the Jonah Gas Field. The Juel Spring Station includes gaseous (NO_x and ozone), a camera system and meteorological monitoring. This station is located in conjunction with the Union Cellular Juel Spring Tower station. The Teledyne-API Model 200A NO_x analyzer at this station was replaced by a Thermo Model 42i on March 6, 2018.

Juel Spring Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Juel Spring	20 miles northwest of Farson, WY	56-035-1002	O_3	Teledyne-API 400A	Urban	Hourly	No planned changes
			$NO/NO_2/NO_x$	Thermo 42i	Urban	Hourly	Instrument was replaced on March 6, 2018

Table 19. Juel Spring Monitor Information

2.2.8 Moxa Arch

The Moxa Arch station was installed in May 2010. This station is located about 25 miles northwest of Green River. The purpose of this monitoring station is to characterize and monitor meteorology and air quality in an area of heavy energy development. This station includes NO_x, SO_2, O_3, PM_{10} (a BAM instrument), a camera system, and meteorological equipment.

Moxa Arch Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Moxa Arch	25 miles northwest of Green River, WY	56-037-0300	O_3	Teledyne-API Model 400E	Urban	Hourly	No planned changes
			$NO/NO_2/NO_x$	Teledyne-API Model 200E	Urban	Hourly	No planned changes
			PM_{10}	Met One BAM 1020	Urban	Hourly	No planned changes
			SO_2	Thermo 43i	Urban	Hourly & 5-minute	No planned changes

Table 20. Moxa Arch Monitor Information

2.2.9 Murphy Ridge

Operations at Murphy Ridge were initiated in 2007. The station is located in the town of Bear River, about 10 miles north of Evanston on the Utah/Wyoming border. This site monitors pollutants transported from Utah including NO_x, O_3, PM_{10} via a continuous TEOM instrument, and meteorological parameters. A camera system is mounted on the shelter to provide visibility monitoring. The data analysis from the 2015 Network Assessment showed no significant trends in air quality concentrations since 2007 and background data needs for modeling have changed. Given that the station has served its purpose to characterize pollutant transport and with possible budget reductions, the Murphy Ridge station could be decommissioned if necessary.

Murphy Ridge Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Murphy Ridge	Bear River, WY	56-041-0101	O_3	Teledyne-API Model 400E	Regional	Hourly	No planned changes
			$NO/NO_2/NO_x$	Teledyne-API Model 200E	Regional	Hourly	No planned changes
			PM_{10}	Thermo Fisher TEOM 1400ab	Regional	Hourly	No planned changes

Table 21. Murphy Ridge Monitor Information

2.2.10 Pinedale Gaseous

The Pinedale Gaseous station began operations in January 2009 because of the need for population-based monitoring in this location, which was noted in the 2008 Southwest Wyoming Network Assessment. This station includes ozone, NO_x, a continuous $PM_{2.5}$ BAM and meteorology within the town of Pinedale. This station monitors pollutant concentrations in the most populated area in the UGRB Ozone NAA. A camera system is also associated with this station on WyVisNet. However, the camera is housed in a different location with the objective of providing an overlook of the town of Pinedale.

Pinedale Gaseous Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Pinedale Gaseous	West side of City Park & Pine Creek	56-035-0101	O_3	Teledyne-API Model 400E	Urban	Hourly	No planned changes
			$NO/NO_2/NO_x$	Teledyne-API Model 200E	Urban	Hourly	No planned changes
			$PM_{2.5}$	Met One BAM 1020	Urban	Hourly	No planned changes

Table 22. Pinedale Gaseous Monitor Information

2.2.11 South Pass

The South Pass station began operation in 2007. The station is located on South Pass at the southern end of the Wind River Range. The purpose of this station is to monitor air quality on the southern end of the range which sees air masses from both the Upper Green River Basin to the northwest, and from the southwestern corner of the State. The station includes gaseous (NO_x and ozone), continuous particulate ($PM_{2.5}$ BAM), camera system and meteorological monitoring. The PM_{10} TEOM was shut down in 2014 and was replaced with a $PM_{2.5}$ BAM. The switch to $PM_{2.5}$ was made to assist the AQD in studying the impact of wildfires in the area.

South Pass Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
South Pass	South Pass, WY	56-013-0099	O_3	Thermo 49i	Urban	Hourly	No planned changes
			$NO/NO_2/NO_x$	Thermo 42i	Urban	Hourly	No planned changes
			$PM_{2.5}$	Met One BAM 1020	Urban	Hourly	No planned changes

Table 23. South Pass Monitor Information

2.2.12 Thunder Basin

The Thunder Basin station is located approximately 30 miles northeast of Gillette, Wyoming and is used to track visibility, meteorology, and air quality in the area. The Thunder Basin Station began operating in October 1999 and includes gaseous (NO_x and ozone), camera system and meteorological monitoring. A new Teledyne API Model T400 ozone analyzer was installed on March 21, 2018 to replace the older Thermo 42i ozone analyzer.

Thunder Basin Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Thunder Basin	30 miles NNE of Gillette, WY	56-005-0123	O_3	Teledyne-API Model T400	Regional	Hourly	Instrument was replaced on March 21, 2018
			$NO/NO_2/NO_x$	Thermo 42i	Regional	Hourly	No planned changes

Table 24. Thunder Basin Monitor Information

2.2.13 Wamsutter

The Wamsutter site is approximately two 2 miles west of the town of Wamsutter. The objective of this station is to track air quality and meteorology in an area of extensive natural gas development. The Wamsutter station includes gaseous (NO_x and O_3), PM_{10}, methane/non-methane hydrocarbons, and meteorological monitoring. A camera system provides coverage of visibility. This station started operations on March 13, 2006.

Wamsutter Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Wamsutter	2 miles west of Wamsutter, WY	56-037-0200	O_3	Thermo 49i	Urban	Hourly	No planned changes
			$NO/NO_2/NO_x$	Thermo 42i	Urban	Hourly	No planned changes
			PM_{10}	Met One BAM 1020	Urban	Hourly	No planned changes

Table 25. Wamsutter Monitor Information

2.2.14 Wright Jr-Sr High School

The Wright monitoring station is located in Campbell County in northern Wyoming. Wright is a community located west of the southern group of the Powder River Basin (PRB) coal mines. The purpose of this monitor is to track population exposure to PM_{10} in a community that is downwind of the coal mines. The data analysis from the 2015 Network Assessment revealed that PM_{10} data at Wright correlated significantly with six nearby industrial monitors in the PRB.

During 2017 the AQD initiated an evaluation of redundancy with other available monitoring data to determine if this station should be decommissioned. However, the Wright station experienced poor data completeness during 2017. As a result, the AQD has opted to increase filter-based sample from the EPA's 1 in 6 sampling schedule to the 1 in 3 sampling schedule starting in the third quarter of 2018. The AQD will reevaluate the possibility of decommissioning the Wright station based on the data collected in 2018 and 2019.

Wright Jr-Sr High School Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Wright Jr-Sr High School	Adjacent to Wright Jr-Sr High School	56-005-0099	PM_{10}	R&P Co. Partisol Model 2000 (Manual filter-based)	Neighborhood	1 in 6 days	The sample frequency will be changed from 1 in 6 to 1 in 3 in 3Q2018.

Table 26. Wright Jr-Sr High School Monitor Information

2.2.15 Powder River Basin-NO_x

The Powder River Basin (PRB) NO_x network began operation in January 2001 through a cooperative agreement between the AQD and the Wyoming Mining Association. The network monitors regional NO_2 concentrations in the PRB. The Belle Ayr BA-4 Station is located near the railroad and represents a "maximum concentration" in and around the coal mines. The Antelope Station is located upwind from mining activities is considered to be background. The AQD also receives data from the Thunder Basin Coal Company's station at Tracy Ranch; this monitoring station is considered downwind of mining activity. The AQD did not list the Tracy Ranch station below because it is funded and operated solely by the Thunder Basin Coal Company. Due to the construction of an oilfield service road less than 100 feet from Antelope Site 3, this site was shut down on July 1, 2013. The Antelope station was moved to a new location, renamed Antelope Site 7, and became operational in February 2015.

PRB NO_x Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Antelope – Site 7	Antelope Site 7	56-009-0009	$NO/NO_2/NO_x$	Teledyne-API 200A	Regional	Hourly	No planned changes
Belle Ayr – BA-4	Belle Ayr BA-4	56-005-0892	$NO/NO_2/NO_x$	Teledyne-API 200A	Micro Scale	Hourly	No planned changes

Table 27. Powder River Basin NO_x Monitor Information

2.2.16 Powder River Basin-$PM_{2.5}$

The Powder River Basin (PRB) $PM_{2.5}$ Network began operation in 1999. The purpose of the network is to characterize ambient fine particulate at and around the PRB coal mines. One monitor is located at each "group" of mines (north, middle and south) and one monitor is located away from mining activities to represent background levels. A collocated monitor is located at the Belle Ayr BA-4 site. Due to the age of the instrumentation in the network, the AQD upgraded the instruments to continuous Thermo 1405DF TEOM monitors in 2010. During the second quarter of 2013, the AQD replaced the 1405DF instruments with Met One BAMs because of reliability issues with the 1405DF instruments. As a result of the construction of an oilfield service road less than 100 feet from Antelope Site 3, it was shut down on July 1, 2013 moved to a new location in February 2015, and renamed Antelope Site 7.

PRB $PM_{2.5}$ Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Antelope – Site 7	Antelope Site 7	56-009-0009	$PM_{2.5}$	Met One BAM 1020	Regional	Hourly	No planned changes
Belle Ayr – BA-4	Belle Ayr BA-4	56-005-0892	$PM_{2.5}$	Met One BAM 1020	Neighborhood	Hourly (primary); Hourly (collocate)	No planned changes
Black Thunder BTM-36-2	BTM-36-2 (Black Thunder Mine)	56-005-0891	$PM_{2.5}$	Met One BAM 1020	Neighborhood	Hourly	No planned changes
Buckskin Mine	Triton Coal Gillette, WY	56-005-1899	$PM_{2.5}$	Met One BAM 1020	Neighborhood	Hourly	No planned changes

Table 28. Powder River Basin $PM_{2.5}$ Monitor Information

2.3 Mobile Monitoring Stations

The AQD has three mobile gaseous monitoring stations that are sited at various locations throughout Wyoming to characterize air quality. As the name of this section implies, these stations are self-contained monitoring shelters that may be moved to different locations in a relatively short period. The stations have gaseous monitors (NO_x, SO_2, O_3, CH_4, and NMHC), continuous PM_{10}, continuous $PM_{2.5}$, a camera system, and meteorological instrumentation. The mobile stations may be used to monitor and characterize events, trends in air quality, or areas downwind of industrial development. The AQD sites and operates the stations at a specific location for approximately one year. As of May 2018, the only mobile monitoring station in operation is Sheridan (Mobile #2). The Casper station (Mobile #3) was decommissioned on January 25, 2018 and will be relocated to Jackson later this year. The Laramie station (Mobile #1) ceased operations on April 4, 2018 and will be relocated to Cody later this year. The complete history of the mobile monitoring stations is found in the table below and is also presented in the accompanying map.

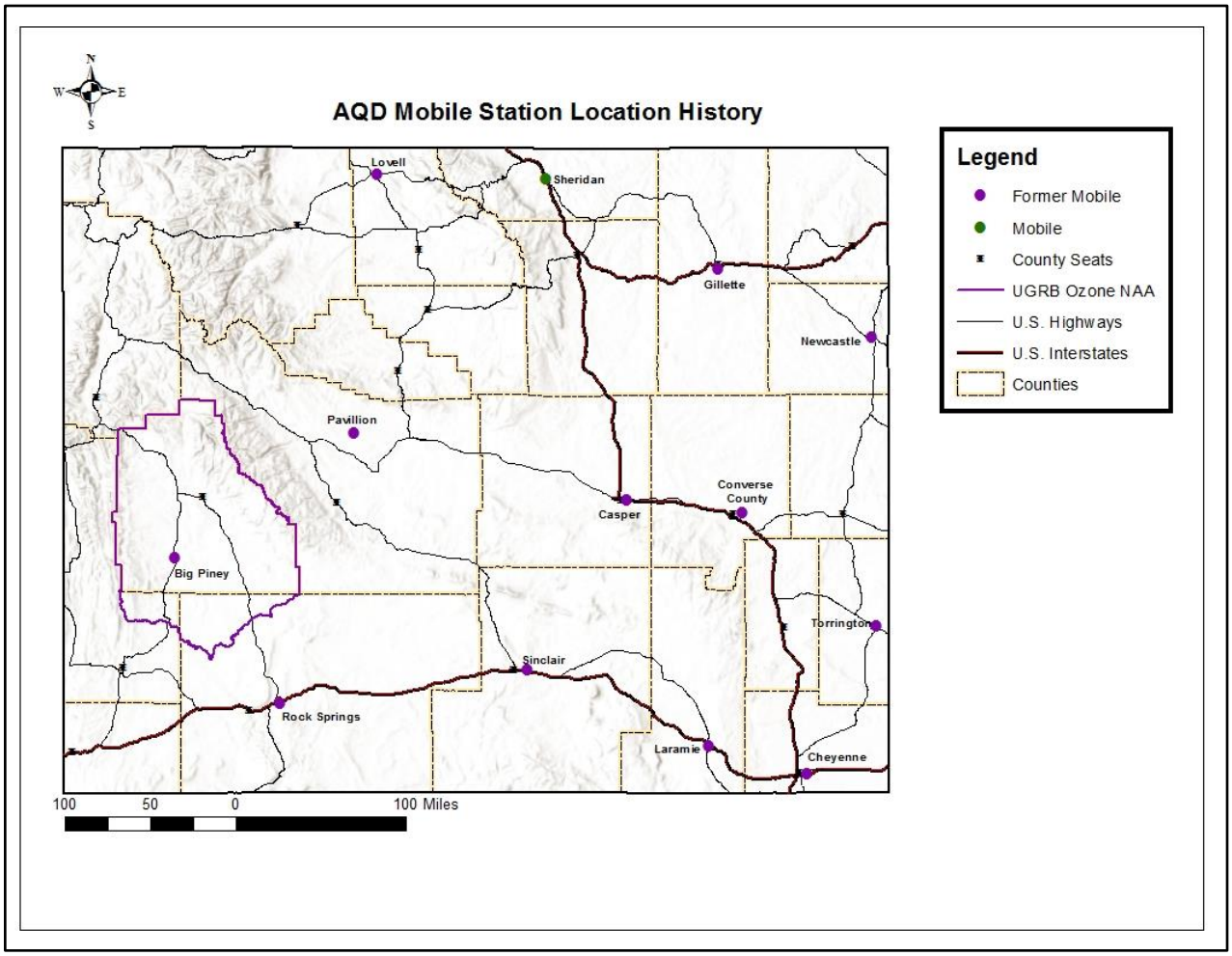


Figure 27. Map of the AQD's Mobile Gaseous Monitoring Stations

Year	Mobile Station #1	Mobile Station #2	Mobile Station #3
2011	Big Piney	Pavillion	Gillette
2012	Big Piney	Pavillion	Converse County
2013	Rock Springs	Sinclair	Converse County
2014	Lovell	Sinclair	Converse County
2015	Lovell/Torrington	Sinclair	Converse County/Newcastle
2016	Torrington	Sinclair/Cheyenne	Newcastle/Casper
2017	Laramie	Cheyenne/Sheridan	Casper
2018 YTD	Laramie	Sheridan	Casper

Table 29. Mobile Gaseous Monitoring Station Location History

2.3.1 Mobile Station #1: Laramie

The Laramie air quality mobile monitoring station operated from April 5, 2017 to April 4, 2018. The mobile station was located within the city limits of Laramie on the southwest side of town, in a residential neighborhood. The station's objective was to characterize the population exposure to multiple air quality parameters in the City of Laramie, located in the vicinity of a large Title V emissions source. This city was identified in the AQD's 2015 Network Assessment as being home to a number of sensitive populations. A digital camera, ozone analyzer, oxides of nitrogen analyzer, sulfur dioxide, methane/non-methane hydrocarbons, continuous PM_{10} and $PM_{2.5}$ BAMs and meteorology equipment were located at this station.

This station will be moved to Cody in 2018. The AQD performed analyses to better characterize the possible influence of emissions from Idaho and Montana prior to siting this station. These analyses can be found in **Appendix E**. Due to the age and progressive failure of the Teledyne 200E NO_x analyzer, this instrument will be replaced by a Thermo 42i analyzer prior to its deployment in Cody.

Mobile Station #1: Laramie Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Laramie Mobile (4/5/2017-4/4/2018)	998 Russell St., Laramie, WY	56-001-0010	O_3	Teledyne-API Model 400E	Urban	Hourly	Will be moved from Laramie to Cody
			$NO/NO_2/NO_x$	Teledyne-API Model 200E	Urban	Hourly	Will be moved from Laramie to Cody. This instrument will be replaced by a Thermo 42i in 2018
			PM_{10}	Met One BAM 1020	Urban	Hourly	Will be moved from Laramie to Cody
			$PM_{2.5}$	Met One BAM 1020	Urban	Hourly	Will be moved from Laramie to Cody
			SO_2	Thermo 43C	Urban	Hourly & 5 minute	Will be moved from Laramie to Cody

Table 30. Mobile Station #1 Monitor Information (Laramie)

2.3.2 Mobile Station #2: Sheridan

The Sheridan air quality mobile monitoring station began operations on August 31, 2017, and is slated to be in place for one year. The station was placed in Sheridan in response to a 2015 Network Assessment finding that there was a need for more population based monitoring beyond what already exists in the area. The AQD performed analyses to better characterize the possible influence of emissions from Montana prior to siting this station. The mobile station is located within the city limits of Sheridan in the middle of town. The station's objective is to characterize the population exposure to multiple air quality parameters in the City of Sheridan, located downwind of a number of large emissions sources in Montana in addition to multiple local sources. A digital camera, ozone analyzer, oxides of nitrogen analyzer, sulfur dioxide, methane/non-methane hydrocarbons, continuous PM_{10} and $PM_{2.5}$ BAMs and meteorology equipment are located at this station. Due to the age and progressive failure of the Teledyne 200E NO_x analyzer, this instrument was replaced by a Thermo 42i analyzer on May 2, 2018.

Mobile Station #2: Sheridan Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Sheridan Mobile (8/31/2017-present)	500 Lewis St., Sheridan, WY	56-033-0006	O_3	Teledyne-API Model 400E	Urban	Hourly	No planned changes
			$NO/NO_2/NO_x$	Teledyne-API Model 200E	Urban	Hourly	This instrument was replaced by a Thermo 42i on May 2, 2018
			PM_{10}	Met One BAM 1020	Urban	Hourly	No planned changes
			$PM_{2.5}$	Met One BAM 1020	Urban	Hourly	No planned changes
			SO_2	Thermo 43C	Urban	Hourly & 5 minute	No planned changes

Table 31. Mobile Station #2 Monitor Information (Sheridan)

2.3.3 Mobile Station #3: Casper

The Casper air quality mobile monitoring station operated from December 1, 2016 to January 25, 2018. The mobile station was located within the city limits of the city of Casper in the center of town. The station's objective was to characterize the population's exposure to sulfur dioxide and other air quality parameters in the city of Casper, located near a large refinery. A digital camera, ozone analyzer, oxides of nitrogen analyzer, sulfur dioxide, methane/non-methane hydrocarbons, continuous PM_{10} and $PM_{2.5}$ BAMs and meteorology equipment were located at this station.

This station will be moved to Jackson in 2018. The AQD performed analyses to better characterize the possible influence of emissions from Montana prior to siting this station. These analyses can be found in **Appendix F**. Due to the age and progressive failure of the Teledyne 200E NO_x analyzer, this instrument will be replaced by a Thermo 42i analyzer prior to its deployment in Jackson.

Mobile Station #3: Casper Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Casper Mobile (12/1/2016-1/25/2018)	500 South Walsh Dr., Casper, WY	56-025-0005	O_3	Teledyne-API Model 400E	Neighborhood	Hourly	Will be moved from Casper to Jackson
			$NO/NO_2/NO_x$	Teledyne-API Model 200E	Neighborhood	Hourly	Will be moved from Casper to Jackson. This instrument will be replaced by a Thermo 42i in 2018
			PM_{10}	Met One BAM 1020	Neighborhood	Hourly	Will be moved from Casper to Jackson
			$PM_{2.5}$	Met One BAM 1020	Neighborhood	Hourly	Will be moved from Casper to Jackson
			SO_2	Teledyne-API M100EU	Neighborhood	Hourly & 5 minute	Will be moved from Casper to Jackson

Table 32. Mobile Station #3 Monitor Information (Casper)

2.4 Cheyenne NCore

The Wyoming NCore monitoring station is located in Cheyenne near the North Soccer Complex Park. The NCore station was established during the summer of 2010 and became fully operational on January 1, 2011. This station was incorporated as part of the National Core Monitoring Network. The NCore stations will be the basis for developing a representative report card on air quality across the nation, capable of delineating differences among geographic and climatological regions. The monitored data will be used to characterize and monitor trends in air quality, compliance with the NAAQS, and may be used for national health assessments, model evaluations, and comparison with other ambient air monitoring data.

As specified in Title 40 Part 58.13(a) of the CFR, the Cheyenne NCore station hosts a large suite of air quality and meteorological parameters. Gaseous parameters include: ozone, $NO/NO_2/NO_x$, trace CO, trace SO_2, and NO_y, total reactive oxides of nitrogen.

Particulate monitoring is a substantial part of routine operations at the NCore station. Currently, this station has a MetOne BAM Coarse system (includes PM_{10} and $PM_{2.5}$ instruments). This setup provides continuous data and an economical way to monitor PM_{10}, $PM_{10\text{-}2.5}$, and $PM_{2.5}$. The primary monitor for $PM_{2.5}$ is a filter-based Very Sharp Cut Cyclone (VSCC) gravimetric monitor. Two Thermo Partisol 2000i Federal Reference Method (FRM) monitors were installed and began sampling on a one in three day schedule on January 1, 2014. This new setup helps fulfill the Wyoming $PM_{2.5}$ monitor network FRM and Federal Equivalent Method (FEM) collocation requirements.

As a result of the 2016 TSA's minor findings in regards to $PM_{2.5}$ bias, the AQD has initiated a special study to collect additional $PM_{2.5}$ collocated FRM data at two locations, on the deck and on the shelter roof, to review comparability with the FEM instrument. $PM_{2.5}$ data is more challenging to measure effectively than PM_{10} due to typically low ambient concentrations. A small measurement error on the order of a few micrograms can yield large proportional error. Further, volatile compounds, a portion of $PM_{2.5}$ can cause measurement difficulties for filter-based FRM samplers and continuous monitors. At the conclusion of the study, the AQD will evaluate whether the location of the FRM instrument has a significant impact on collocated data.

Figure 28. Cheyenne NCore station image

Cheyenne NCore Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Cheyenne NCore	6909 Chief Washakie Ave. Cheyenne, WY	56-021-0100	O_3	Teledyne-API Model T400	Neighborhood	Hourly	No planned changes
			$NO/NO_2/NO_x$	Teledyne-API 200U	Neighborhood	Hourly	No planned changes
			NO_y	Teledyne-API M200EU NOY	Regional	Hourly	No planned changes
			Trace SO_2	Teledyne-API T100U	Neighborhood	Hourly	No planned changes
			Trace CO	Thermo Electron 48i-TLE	Neighborhood	Hourly	No planned changes
			PM_{10}	Met One BAM 1020	Neighborhood	Hourly	No planned changes
			$PM_{10-2.5}$	Met One BAM 1020	Neighborhood	Hourly	No planned changes
			$PM_{2.5}$	Met One BAM 1020	Neighborhood	Hourly	No planned changes
			$PM_{2.5}$ (Primary)	R&P Model 2000 $PM_{2.5}$ Air Sampler w/ VSCC (filter-based)	Neighborhood	1 in 3 days (primary); 1 in 12 days (collocate)	No planned changes
			Speciated $PM_{2.5}$	URG 3000N (filter-based)	Neighborhood	1 in 3 days	No planned changes

Table 33. Cheyenne NCore Monitor Information

3.0 Compliance with NAAQS

The primary purpose of the AQD's SLAMS and SPM networks is to evaluate compliance with the NAAQS. These monitoring networks utilize FRM and FEM technologies and operate according to the SLAMS or Prevention of Significant Deterioration (PSD) quality assurance specifications in order to be used for NAAQS comparison. The AQD's SLAMS and SPM networks also operate under project-specific quality assurance project plans (QAPPs) which are available in the Cheyenne office for inspection. The following tables in Section 3 also contain data from the mobile gaseous stations. These stations do operate according to the EPA's specifications for NAAQS comparison, but they are typically deployed for no more than 12 months and usually do not possess a complete calendar year of data. The mobile gaseous stations, therefore, are generally not comparable to the design value, the true test of compliance with the NAAQS.

The following tables in Section 3 show 2015-2017 data and design values for each SLAMS and SPM monitoring station. All stations that operated in 2017 are included in the tables. All stations operated by the AQD comply with the NAAQS from 2015-2017.

3.1 Particulate Matter (PM_{10})

There were 23 stations that monitored for PM_{10} at any time in 2017. The SLAMS network has nine stations that use manual samplers and one that uses a continuous sampler. There is 30% collocation among the SLAMS that use the manual samplers. This fulfills the collocation requirements of Title 40, Part 58 Appendix A of the CFR. The remainder of the AQD monitoring network (NCore and SPMs) use continuous monitoring.

To comply with the 24-hour PM_{10} NAAQS, a monitor may only have one exceedance (a 24-hour average concentration greater than 150 $\mu g/m^3$) per year on average over a three-year period. The design value is the average number of exceedances per year from 2015-2017. A design value of zero means the station has not recorded any values over 150 $\mu g/m^3$ during the three-year period. Wyoming also has an ambient air quality standard for PM_{10} in its State regulations. Compliance with the annual Wyoming Ambient Air Quality Standards (WAAQS) is determined by the three-year average of the annual mean. The three-year average of the mean must be below 50 $\mu g/m^3$. The two tables in Section 3.1 show PM_{10} values with respect to the NAAQS and the WAAQS. The tables throughout Section 3 may contain special notations in place of values. These notations are explained below in the footer.

PM_{10} Compliance with NAAQS of 150 µg/m^3					
Highest 24-Hour Average (µg/m^3)					
Site Name	**2015**	**2016**	**2017**	**Design Value (2015-2017)**	**In Compliance**
SLAMS					
Casper	59	46	71	0	Yes
Cheyenne	44	28	100	0	Yes
Cody	44	53	45	0	Yes
Gillette	39	40	48	0	Yes
Jackson	53	48	33	0	Yes
Lander	53	30	41	0	Yes
Laramie	41	33	92	0	Yes
Rock Springs	54	41	91	0	Yes
Sheridan-Meadowlark	68	54	45	0	Yes
Sheridan-Police Station	94	72	83	0	Yes
SPM					
Boulder	40*	40	55	0	Yes
Campbell County	135	63	113	0	Yes
Converse County	42*	62	122	0	Yes
Daniel South	36	27*	51	0	Yes
Moxa Arch	52	41	94	0	Yes
Murphy Ridge	59	42	51	0	Yes
Wamsutter	47	32*	61	0	Yes
Wright Jr-Sr High School	66	29*	43*	0	Yes
NCore					
Cheyenne NCore	78	34	117	0	Yes
Mobile Stations**					
Casper	N/A	N/A	76	N/A	N/A
Cheyenne	N/A	40*	38*	N/A	N/A
Converse County	71*	N/A	N/A	N/A	N/A
Laramie	N/A	N/A	97*	N/A	N/A
Lovell	86*	N/A	N/A	N/A	N/A
Newcastle	42*	39*	N/A	N/A	N/A
Sheridan	N/A	N/A	97*	N/A	N/A
Sinclair	82	27*	N/A	N/A	N/A
Torrington	N/A	110	N/A	N/A	N/A

Table 34. PM_{10} 24-hr NAAQS Comparison

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

PM_{10} Compliance with WAAQS of 50 µg/m^3					
Annual Arithmetic Mean (µg/m^3)					
Site Name	**2015**	**2016**	**2017**	**Average (2015-2017)^**	**In Compliance**
SLAMS					
Casper	15	13	13	13	Yes
Cheyenne	10	10	11	10	Yes
Cody	11	10	12	11	Yes
Gillette	11	13	15	13	Yes
Jackson	15	12	12	13	Yes
Lander	15	14	14	14	Yes
Laramie	14	15	14	14	Yes
Rock Springs	16	16	17	16	Yes
Sheridan-Meadowlark	10	10	12	10	Yes
Sheridan-Police Station	17	17	18	17	Yes
SPM					
Boulder	6*	6	8	6*	Yes
Campbell County	12	10	10	10	Yes
Converse County	7*	6	9	7*	Yes
Daniel South	6	5*	5	5*	Yes
Moxa Arch	6	6	9	7	Yes
Murphy Ridge	9	8	9	8	Yes
Wamsutter	10	8*	8	8*	Yes
Wright Jr-Sr High School	15	11*	13*	13*	Yes
NCore					
Cheyenne NCore	9	10	11	10	Yes
Mobile Stations**					
Casper	N/A	N/A	11	N/A	N/A
Cheyenne	N/A	15*	10*	N/A	N/A
Converse County	8*	N/A	N/A	N/A	N/A
Laramie	N/A	N/A	16*	N/A	N/A
Lovell	15*	N/A	N/A	N/A	N/A
Newcastle	14*	11*	N/A	N/A	N/A
Sheridan	N/A	N/A	15*	N/A	N/A
Sinclair	10	5*	N/A	N/A	N/A
Torrington	N/A	25	N/A	N/A	N/A

Table 35. PM_{10} Annual WAAQS Comparison

3.2 Particulate Matter ($PM_{2.5}$)

Twenty AQD monitoring stations collected $PM_{2.5}$ data at some point during 2017. Within the $PM_{2.5}$ SLAMS network, the AQD has 22.2% of the monitors collocated to meet the 15% collocation requirement of Title 40, Part 58 Appendix A of the CFR. The AQD uses manual samplers to collect the data at the SLAMS locations. The SPMs, NCore, and mobile locations use continuous samplers to monitor $PM_{2.5}$. The annual standard is attained when the three-year average does not exceed 12.0 µg/m^3. The 24-hour $PM_{2.5}$ NAAQS is 35 µg/m^3. Compliance with this standard is determined from the 3-year average of the 98th percentile concentration. Below are two tables that compare $PM_{2.5}$ data under the different standards.

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

$PM_{2.5}$ Compliance with NAAQS of 35 µg/m^3					
98% 24-Hour Average					
Site Name	**2015**	**2016**	**2017**	**Average (2015-2017)**	**In Compliance**
SLAMS					
Casper	14.7	11.0*	22.9	16*	Yes
Cheyenne	24.7	8.0	11.3	15	Yes
Cody	19.4	21.9	27.5	23	Yes
Jackson	14.9	11.6	18.0*	15*	Yes
Lander	20.1	22.0	26.6	23	Yes
Laramie	15.2	10.9	13.5	13	Yes
Rock Springs	18.6	16.6	23.0	19	Yes
Sheridan-Meadowlark	24.0	17.7	21.7	21	Yes
Sheridan-Police Station	24.8	22.8	25.1*	24*	Yes
SPM					
Antelope Site 7 (PRB-$PM_{2.5}$ Network)	18.5	9.6	20.1*	16*	Yes
Belle Ayr BA-4 (PRB-$PM_{2.5}$ Network)	18.5	13.7	23.4	19	Yes
Black Thunder BTM-36-2 (PRB-$PM_{2.5}$ Network)	21.6*	11.0*	25.5*	19*	Yes
Buckskin (PRB-$PM_{2.5}$ Network)	21.0	9.4	26.0	19	Yes
Pinedale Gaseous	14.3	13.0	21.0	16	Yes
South Pass	11.6	7.8	12.8	11	Yes
NCore					
Cheyenne NCore	20.9	10.3	10.9	14	Yes
Mobile Stations**					
Casper	N/A	N/A	16.3	N/A	N/A
Cheyenne	N/A	11.5*	12.0*	N/A	N/A
Converse County	9.9*	N/A	N/A	N/A	N/A
Laramie	N/A	N/A	13.3*	N/A	N/A
Lovell	14.5	N/A	N/A	N/A	N/A
Newcastle	22.8*	9.9	N/A	N/A	N/A
Sheridan	N/A	N/A	39.9*	N/A	N/A
Sinclair	11.2	17.2*	N/A	N/A	N/A
Torrington	N/A	11.2	N/A	N/A	N/A

Table 36. $PM_{2.5}$ 24-hr NAAQS Comparison 98th Percentile

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

$PM_{2.5}$ Compliance with NAAQS of 12.0 µg/m^3					
Annual Arithmetic Mean (µg/m^3)					
Site Name	**2015**	**2016**	**2017**	**Average (2015-2017)**	**In Compliance**
SLAMS					
Casper	4.9	4.5*	5.2	4.9*	Yes
Cheyenne	4.1	4.0	4.7*	4.3*	Yes
Cody	4.2	3.7	5.0	4.3	Yes
Jackson	4.7	4.4	4.8*	4.6*	Yes
Lander	6.2	6.8	7.4	6.8	Yes
Laramie	4.2	3.9	4.8	4.3	Yes
Rock Springs	4.8	5.0	5.6	5.1	Yes
Sheridan-Meadowlark	5.5	4.7	6.4	5.6	Yes
Sheridan-Police Station	7.4	6.8	7.2*	7.1*	Yes
SPM					
Antelope Site 7 (PRB-$PM_{2.5}$ Network)	4.2	2.7	5.8*	4.2*	N/A
Belle Ayr BA-4 (PRB-$PM_{2.5}$ Network)	4.9	4.1	5.4	4.8	Yes
Black Thunder BTM-36-2 (PRB-$PM_{2.5}$ Network)	4.9*	3.5*	5.5*	4.6*	Yes
Buckskin (PRB-$PM_{2.5}$ Network)	2.2	2.6	5.6	3.5	Yes
Pinedale Gaseous	5.0	4.6	5.7	5.1	Yes
South Pass	2.5	2.3	3.2	2.7	Yes
NCore					
Cheyenne NCore	4.3	4.5	3.4	4.1	Yes
Mobile Stations**					
Casper	N/A	N/A	4.0	N/A	N/A
Cheyenne	N/A	5.1*	4.5*	N/A	N/A
Converse County	6.9*	N/A	N/A	N/A	N/A
Laramie	N/A	N/A	4.8*	N/A	N/A
Lovell	8.6*	N/A	N/A	N/A	N/A
Newcastle	6.8*	2.8*	N/A	N/A	N/A
Sheridan	N/A	N/A	9.8*	N/A	N/A
Sinclair	2.2	2.6*	N/A	N/A	N/A
Torrington	N/A	3.7	N/A	N/A	N/A

Table 37. $PM_{2.5}$ Annual NAAQS Comparison

During August and September of 2017, wildfires were prevalent throughout the western United States. While Wyoming did not have the large quantity or size of wildfires experienced in other states, wildfire smoke affected the particulate matter concentration and visibility conditions around the state. From 9/1/2017-9/14/2017, 35 exceedances of the 24-Hour $PM_{2.5}$ NAAQS were recorded at AQD stations. The AQD is preparing an Exceptional Event demonstration for this period in collaboration with other stakeholders. The demonstration will have more information about these wildfires and the meteorological conditions that affected particulate matter monitors. The $PM_{2.5}$ exceedances of the 24-Hour NAAQS are shown in the table below.

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

Site Name	24-Hour Average (µg/m^3)	Date
Buckskin Mine (PRB Network)	47.0	9/1/2017
Belle Ayr BA-4 (PRB Network)	58.1	9/1/2017
Black Thunder BTM-36-2 (PRB Network)	64.7	9/1/2017
Sheridan Mobile	39.9	9/1/2017
Cheyenne NCore	68.5	9/1/2017
Sheridan-Police Station	40.3	9/1/2017
Sheridan-Meadowlark	39.5	9/1/2017
Belle Ayr BA-4 (PRB Network)	51.1	9/2/2017
Buckskin Mine (PRB Network)	60.6	9/2/2017
Wheatland BAM Station	36.4	9/2/2017
Black Thunder BTM-36-2 (PRB Network)	49.5	9/2/2017
Cheyenne NCore	72.8	9/3/2017
Belle Ayr BA-4 (PRB Network)	79.9	9/3/2017
Buckskin Mine (PRB Network)	71.1	9/3/2017
Black Thunder BTM-36-2 (PRB Network)	81.0	9/3/2017
Sheridan Mobile	63.4	9/3/2017
Wheatland BAM Station	52.8	9/3/2017
Casper Mobile	50.1	9/3/2017
Cheyenne NCore	68.5	9/4/2017
Cheyenne NCore	72.8	9/4/2017
Laramie Mobile	59.5	9/4/2017
Casper Mobile	42.5	9/4/2017
Casper	39.7	9/4/2017
Cheyenne	65.4	9/4/2017
Wheatland BAM Station	56.2	9/4/2017
Laramie	56.6	9/4/2017
Pinedale Gaseous	36.1	9/7/2017
Buckskin Mine (PRB Network)	46.1	9/13/2017
Black Thunder BTM-36-2 (PRB Network)	38.0	9/13/2017
Sheridan-Police Station	45.2	9/13/2017
Sheridan-Meadowlark	42.7	9/13/2017
Sheridan Mobile	38.7	9/13/2017
Antelope Site 7 (PRB Network)	43.7	9/14/2017
Belle Ayr BA-4 (PRB Network)	37.0	9/14/2017
Black Thunder BTM-36-2 (PRB Network)	47.8	9/14/2017

Table 38. Exceedances of the 24-Hour $PM_{2.5}$ NAAQS at AQD Stations during September 2017.

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

3.3 Nitrogen Dioxide (NO_2)

In 2017, 20 AQD stations monitored NO_2. Compliance with the annual primary NO_2 NAAQS is achieved when the annual average concentration in the calendar year is less than or equal to 53 ppb. The primary standard one-hour average concentration is 100 ppb. The maximum one-hour concentration per year is listed in the second NO_2 table below. The NO_2 calculated design value is the three-year average of the 98th Percentile of the daily maximum one-hour concentrations. The design value is met when it does not exceed 100 ppb. The calculated three-year design value is located in the second NO_2 table below.

NO_2 Compliance with NAAQS of 53 ppb				
Annual Arithmetic Mean (ppb)				
Site Name	**2015**	**2016**	**2017**	**In Compliance**
Antelope Site 7 (PRB-NO_x Network)	3	2	3	Yes
Belle Ayr BA-4 (PRB-NO_x Network)	6	4	5	Yes
Big Piney	1	1	1	Yes
Boulder	1	1	5	Yes
Campbell County	3	2	2	Yes
Casper Gaseous	5	4	4	Yes
Converse County	0*	0	0	Yes
Daniel South	0	1	1	Yes
Juel Spring	1	1	1	Yes
Moxa Arch	2	1	1	Yes
Murphy Ridge	2	2	2	Yes
Pinedale Gaseous	2	3	3	Yes
South Pass	1	0	0	Yes
Thunder Basin	1	1	1	Yes
Wamsutter	3	4	3	Yes
NCore				
Cheyenne NCore	4	4	4	Yes
Mobile Stations**				
Casper	N/A	N/A	5	N/A
Cheyenne	N/A	8*	9*	N/A
Converse County	3*	N/A	N/A	N/A
Laramie	N/A	N/A	7*	N/A
Lovell	3*	N/A	N/A	N/A
Newcastle	5*	3*	N/A	N/A
Sheridan	N/A	N/A	6*	N/A
Sinclair	6	8*	N/A	N/A
Torrington	N/A	4	N/A	N/A

Table 39. NO_2 Comparison with the Annual NAAQS

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

NO_2 Compliance with NAAQS of 100 ppb					
Annual 98% of Daily Maximum 1-hour average (ppb)				3-year 98% 1-hour Design Value (ppb)	
Site Name	**2015**	**2016**	**2017**	**Design Value (2015-2017)**	**In Compliance**
Antelope Site 7 (PRB-NO_x Network)	34.9*	29.9	31.5	32*	Yes
Belle Ayr BA-4 (PRB-NO_x Network)	31.7	27.5	28.3	29	Yes
Big Piney	7.9	7.7	8.6	8	Yes
Boulder	11.6	9.6	21.2	14	Yes
Campbell County	31.5*	28.8	30.5	30*	Yes
Casper Gaseous	42.3	39.1	38.0	40	Yes
Converse County	7.7*	8.2	9.1	8*	Yes
Daniel South	2.8	3.2	3.3	3	Yes
Juel Spring	9.7	8.0	9.6	9	Yes
Moxa Arch	18.6	22.5	18.3	20	Yes
Murphy Ridge	11.6	11.7	16.4	13	Yes
Pinedale Gaseous	19.6	19.1	32.6	24	Yes
South Pass	5.1	5.0	3.1	4	Yes
Thunder Basin	7.9	6.4	8.2	8	Yes
Wamsutter	34.7	29.8	32.8	32	Yes
NCore					
Cheyenne NCore	37.5	33.2	33.3	35	Yes
Mobile Stations**					
Casper	N/A	N/A	44.2	N/A	N/A
Cheyenne	N/A	43.7*	59.6*	N/A	N/A
Converse County	23.6*	N/A	N/A	N/A	N/A
Laramie	N/A	N/A	40.3*	N/A	N/A
Lovell	24.1	N/A	N/A	N/A	N/A
Newcastle	28.1*	23.2*	N/A	N/A	N/A
Sheridan	N/A	N/A	34.6*	N/A	N/A
Sinclair	35.9	57.0*	N/A	N/A	N/A
Torrington	N/A	24.8	N/A	N/A	N/A

Table 40. NO_2 Comparison with the Hourly NAAQS

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

3.4 Sulfur Dioxide (SO_2)

During 2017, six AQD monitoring stations monitored for SO_2 at some point. The NAAQS one-hour primary standard is met when the three-year average of the annual 99th percentile of the daily maximum one-hour average concentration does not exceed 75 ppb.

SO_2 Compliance with NAAQS of 75 ppb					
Annual 99% 1-hour average (ppb)				3-year 99% 1-hour average (ppb)	
Site Name	2015	2016	2017	Design Value (2015-2017)	In Compliance
Moxa Arch	18	29	17	21	Yes
NCore					
Cheyenne NCore	19	3	5	9	Yes
Mobile Stations**					
Casper	N/A	N/A	4*	N/A	N/A
Cheyenne	N/A	30*	12*	N/A	N/A
Laramie	N/A	N/A	3*	N/A	N/A
Newcastle	6*	2*	N/A	N/A	N/A
Sheridan	N/A	N/A	2*	N/A	N/A
Sinclair	6*	5*	N/A	N/A	N/A
Torrington	N/A	2	N/A	N/A	N/A

Table 41. SO_2 1-hr NAAQS Comparison

3.5 Carbon Monoxide (CO)

The AQD operated two trace CO monitors in 2017: Cheyenne NCore and Converse County. The level for the eight-hour NAAQS for CO is 9 ppm. The level for the one-hour NAAQS for CO is 35 ppm.

CO Compliance with NAAQS							
35 ppm Maximum 1-hour average concentration (ppm)				9 ppm Maximum 8-hour average concentration (ppm)			In Compliance
Site Name	2015	2016	2017	2015	2016	2017	
Converse County	N/A	N/A	0.12*	N/A	N/A	0.1*	N/A
NCore							
Cheyenne NCore	0.49	0.40	0.88	0.5	0.3	0.8	Yes

Table 42. CO NAAQS Comparison

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

3.6 Ozone (O_3)

The AQD monitored for ozone at 19 stations in Wyoming at some point in 2017. Hourly ozone readings from a monitor are used to compute the daily maximum eight-hour ozone average at the station. These daily maximum eight-hour ozone averages are ranked throughout the calendar year. The 4th highest annual value in a calendar year is then averaged with 4th highest annual values from two more years to compute a three-year average referred to as the design value. The design value must not exceed 0.070 ppm. On December 28, 2015, the EPA promulgated the new ozone NAAQS in Title 40, Part 50.19(a) of the CFR. In addition to the new NAAQS, the EPA updated the calculation methodology to compute the design value. The exact methodology can be found in Title 40, Part 50 Appendix U of the CFR. The 4th highest annual values from 2015-2017 and the design value are presented in the table below along with a graph of 4th highest annual values at various stationary monitoring stations (active and decommissioned) from 2005-2017.

On July 20, 2012, the EPA designated all of Sublette County and parts of Lincoln and Sweetwater Counties as a Marginal NAA for ozone using the 2008 Ozone NAAQS of 0.075 ppm. The remaining portion of Wyoming is designated Attainment/Unclassifiable for the 2008 Ozone NAAQS.

After the 2015 Ozone NAAQS was made effective, Wyoming Governor Matt Mead recommended to the EPA that Wyoming's 23 counties be designated as Attainment for this standard. The Federal Register (**82 FR 54232**) designated 21 of Wyoming's counties Attainment/Unclassifiable according to the 2015 Ozone NAAQS. This rule was made effective on January 16, 2018. On June 4, 2018, the EPA announced (**83 FR 25776**) the remaining 2 counties in Wyoming, Albany County and Laramie County, would be designated Attainment/Unclasifiable for the 2015 Ozone NAAQS on August 3, 2018.

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

O_3 Compliance with NAAQS of 0.070 ppm 4th Highest 8-Hour Average (ppm)					
Site Name	**2015**	**2016**	**2017**	**Design Value (2015-2017)**	**In Compliance**
Big Piney	0.059	0.065	0.066	0.063	Yes
Boulder	0.055	0.060	0.073	0.062	Yes
Campbell County	0.062	0.060	0.068	0.063	Yes
Casper Gaseous	0.060	0.061	0.063	0.061	Yes
Converse County	0.060	0.059	0.066	0.061	Yes
Daniel South	0.062	0.063	0.061	0.062	Yes
Hiawatha	0.062	0.061	0.060	0.061	Yes
Juel Spring	0.061	0.059	0.068	0.062	Yes
Moxa Arch	0.071	0.064	0.067	0.067	Yes
Murphy Ridge	0.066	0.060	0.060	0.062	Yes
Pinedale Gaseous	0.059	0.059	0.065	0.061	Yes
South Pass	0.062	0.062	0.063	0.062	Yes
Thunder Basin	0.059	0.057	0.064	0.060	Yes
Wamsutter	0.060	0.045	0.054	0.053	Yes
NCore					
Cheyenne NCore	0.063	0.061	0.065	0.063	Yes
Mobile Stations**					
Casper	N/A	N/A	0.063	N/A	N/A
Cheyenne	N/A	0.060*	0.055*	N/A	N/A
Converse County	0.060*	N/A	N/A	N/A	N/A
Laramie	N/A	N/A	0.061*	N/A	N/A
Lovell	0.056*	N/A	N/A	N/A	N/A
Newcastle	0.059*	0.060*	N/A	N/A	N/A
Sheridan	N/A	N/A	0.056*	N/A	N/A
Sinclair	0.061	0.047*	N/A	N/A	N/A
Torrington	N/A	0.059	N/A	N/A	N/A

Table 43. O_3 8-hr NAAQS Comparison

Each year, the AQD enhances its monitoring coverage of ambient air and meteorological conditions in the UGRB from January 1st through March 31st. During these winter months, there is an increased likelihood of observing elevated ozone values due to at least four factors: adequate amounts of precursor chemicals, snow cover, temperature inversions and low winds, and sunlight. In 2017, the AQD observed 12 exceedances of the 2015 Ozone NAAQS of 0.070 ppm.

The AQD also observed ozone exceedances at the Campbell County and Cheyenne NCore stations and elevated ozone concentrations at several other monitoring stations in the summer months of 2017. The AQD has performed preliminary evaluations of these elevated values and found that smoke from wildfires has influenced these monitors. The AQD is assessing the possibility of committing resources to submit an Exceptional Event notification and demonstration for summer 2017 ozone exceedance. The exceedances for all of 2017 are shown in the table below.

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

Site Name	8-hr Daily Max Average (ppm)	Date	Circumstances
Boulder	0.077	1/19/2017	Winter Ozone
Boulder	0.071	2/14/2017	Winter Ozone
Boulder	0.073	2/15/2017	Winter Ozone
Juel Spring	0.077	2/15/2017	Winter Ozone
Moxa Arch	0.074	2/15/2017	Investigating
Boulder	0.072	2/17/2017	Winter Ozone
Boulder	0.082	3/3/2017	Winter Ozone
Big Piney	0.073	3/4/2017	Winter Ozone
Boulder	0.085	3/4/2017	Winter Ozone
Daniel South	0.079	3/4/2017	Winter Ozone
Juel Spring	0.074	3/4/2017	Winter Ozone
Pinedale Gaseous	0.078	3/4/2017	Winter Ozone
Campbell County	0.072	7/22/2017	Wildfire Smoke
Cheyenne NCore	0.072	7/23/2017	Wildfire Smoke & Transport
Campbell County	0.074	9/1/2017	Wildfire Smoke

Table 44. Recorded Exceedances of the 2015 Ozone NAAQS in 2017.

- N/A – Site was not in operation at all for the year of study.
- * - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.
- ** - Mobile Stations are in one location for approximately one year.
- ^ - For the three-year average, incomplete data years were used per WAQSR Chapter 2 Appendix 1.

4.0 Special Studies

4.1 UGWOS

In the winters of 2005 and 2006, specifically February, the AQD measured 8-hour ozone concentrations greater than 80 ppb at the Daniel South, Jonah, and Boulder monitoring stations. This precipitated a study to research the winter ozone phenomenon. The purposes of the study were, originally, to better understand the reaction mechanisms and collect sufficient data to form a conceptual model of the winter ozone formation. Since 2007, the objectives of the study have been modified to minimize gaps in the data and to conceptually understand the formation of winter ozone with the ultimate intent of developing a working photochemical grid model for the UGRB.

During the summer of 2014, the AQD critically evaluated the Upper Green Winter Ozone Study (UGWOS) with respect to the current ozone reduction objective. The AQD reduced short-term winter monitoring for 2015 to Volatile Organic Compounds (VOC) and aldehydes only, based on this evaluation. In 2018, the UGWOS included speciated VOC and aldehyde monitoring at the following long-term stations within the UGRB NAA: Big Piney, Boulder, and Juel Spring. Additionally, speciated VOCs were collected at Moxa Arch.

Quality Assurance Plans, data, and final reports from the UGWOS campaigns are available for download from the **AQD website**.

4.2 VOC Monitoring

The AQD continues to perform continuous methane/non-methane hydrocarbon measurements at the Boulder SPM location in addition to pulling periodic speciated VOC canisters. The AQD also operates methane/non-methane hydrocarbon analyzers at its mobile gaseous stations and the Wamsutter and Converse County SPM locations.

4.3 Mobile BAM Station

The AQD has equipped a mobile monitoring station with continuous BAM PM_{10} and $PM_{2.5}$ monitors for deployment in communities possibly affected by windblown dust or smoke from agricultural burning or wildfire activity. This station allows the AQD to monitor near-real time PM_{10} and $PM_{2.5}$ concentrations, in addition to meteorological conditions, so the AQD can properly inform the public when particulate levels may cause adverse health effects.

Year	Location
2011	Sinclair/Worland
2012	Worland
2013	NO LOCATION
2014	Afton
2015	Worland
2016	Worland
2017	Wheatland
2018	Wheatland/Saratoga

Table 45. Mobile BAM Location History

4.3.1 Wheatland

The AQD mobile BAM monitoring station was deployed to Wheatland on March 1, 2017 to monitor particulate matter concentrations and meteorological conditions. The objective of this station is to monitor particulate matter concentrations in a populated area that has registered complaints regarding windblown dust and smoke. Data collection in Wheatland will continue until July 2018. Following the data collection period, the mobile BAM monitoring station will be moved to the town of Saratoga.

4.4 Grand Teton

The AQD and National Park Service (NPS) work cooperatively to fund a portion of the Grand Teton Monitoring Station located near the Teton Science School in the Grand Teton National Park. This monitoring station includes ozone, the National Atmospheric Deposition Program (NADP) wet deposition, a Nephelometer, camera system, and meteorological instrumentation.

4.5 Intermountain West Data Warehouse Project

Since 2010, the AQD has participated in the Intermountain West Data Warehouse (IWDW); previously known as the Three-State Study. The IWDW provides high quality tools for understanding and assessing the effects of current and future energy development and associated emissions. The IWDW is a cooperative venture between the Wyoming AQD, state agencies from Colorado, Utah, and New Mexico, Federal Land Managers, and the EPA. As part of this project, the Federal Government partially funded the Hiawatha station and contributed funding to install a methane/non-methane hydrocarbon analyzer along with special canisters at the Wamsutter monitoring station. The AQD is continuing to fund the Hiawatha Monitoring Station and the methane/non-methane hydrocarbon analyzer at Wamsutter in 2018. These and other data from the IWDW project can be viewed at the IWDW website: **http://views.cira.colostate.edu/TSDW/**.

4.6 IMPROVE Network

The purpose of the Interagency Monitoring of Protected Visual Environments (IMPROVE) network is to establish current visibility and aerosol conditions along with the characterizing broad regional trends and visibility conditions using monitoring data collected at or near Class I areas across the United States. There are four IMPROVE locations in Wyoming: Yellowstone National Park, Est. 1988; Bridger Wilderness Areas, Est. 1988; North Absaroka Wilderness Area, Est. 2000; Thunder Basin National Grasslands, Est. 2002.

5.0 Industrial Ambient Monitoring in Wyoming

Historically, the AQD has required several industrial sources in Wyoming to conduct ambient monitoring for criteria pollutants at and near specific facilities due to permit conditions and other circumstances. As facilities obtain construction or modification permits from the AQD's New Source Review (NSR) program, the facilities are often required to monitor for compliance with the NAAQS downwind of their facilities. This section discusses industrial ambient monitoring in Wyoming.

5.1 Permitted Industrial Monitors

Title 40 Part 58 Appendix A 1.1(a) of the CFR states "This appendix specifies the minimum quality system requirements applicable to SLAMS and other monitor types whose data are intended to be used to determine compliance with the NAAQS (*e.g.*, SPMs, tribal, CASTNET, NCore, industrial, etc.), unless the EPA Regional Administrator has reviewed and approved the monitor for exclusion from NAAQS use and these quality assurance requirements." The AQD's Ambient and Emission Monitoring Section has long worked with EPA Region VIII and facilities to oversee ambient monitoring and requires operations of ambient monitors at facilities to collect data intended to be used to determine compliance with the NAAQS. The AQD's industrial monitoring program has existed since the 1980s and has been developed with EPA Region VIII through several mechanisms including the "Memorandum of Agreement on Procedures for Protecting PM_{10} NAAQS in the Powder River Basin" (Powder River Basin MOA) and the WDEQ – EPA Performance Partnership Agreement (PPA). The Powder River Basin MOA and WDEQ-EPA PPA concept has been applied to industrial monitoring across the State of Wyoming, resulting in a consistent industrial monitoring program implemented by the AQD for over 30 years. The AQD has a standardized approach to cooperative monitor siting, approving quality assurance plans, oversight of quarterly reporting, reporting and uploading data to AQS, and responding to EPA inquiries for permit-required industrial monitoring stations.

In a 2016 rule change to Title 40 Part 58 Appendix A of the CFR by EPA, the regulation and oversight of the quality procedures of these networks was transferred from the AQD to the EPA Regional office. The AQD and EPA Regional office have agreed to explore options to return quality oversight functions to the AQD. The AQD is therefore putting forth the following proposal for the implementation of Title 40 Part 58 of the CFR quality oversight requirements of industrial monitoring networks with the exception of monitoring covered by the SO_2 Data Requirements Rule. Monitors included in the SO_2 Data Requirements Rule are discussed in **Section 5.2** and the structure for oversight of these monitors can be found in AQD's 2017 Network Plan.

Background

Multiple portions of Title 40 Part 58 Appendix A of the CFR contain language indicating that there is a degree of flexibility in the application of the quality checks and procedures and quality system requirements outlined in the appendix. Such portions include Sections 1.2.3 and 1.5:

Title 40 Part 58 App. A 1.2.3 of the CFR:

> *"Each PQAO is required to implement a quality system that provides sufficient information to assess the quality of the monitoring data. The quality system must, at a minimum, include the specific requirements described in this appendix. Failure to conduct or pass a required check or procedure, or a series of required checks or procedures, does not by itself invalidate data for regulatory decision making. Rather, PQAOs and the EPA shall use the checks and procedures required in this appendix in combination with other data quality information, reports, and similar documentation that demonstrate overall compliance with Part 58. Accordingly, the EPA and PQAOs shall use a "weight of evidence" approach when determining the suitability of data for regulatory decisions. The EPA reserves the authority to use or not use monitoring data submitted by a monitoring organization when making regulatory decisions based on the EPA's assessment of the quality of the data. Consensus built validation templates or validation criteria already approved in QAPPs should be used as the basis for the weight of evidence approach."*

Title 40 Part 58 App. A 1.5 of the CFR:

> *"Periodic assessments and documentation of data quality are required to be reported to the EPA. To provide national uniformity in this assessment and reporting of data quality for all networks, specific assessment and reporting procedures are prescribed in detail in sections 3, 4, and 5 of this appendix. On the other hand, the selection and extent of the quality assurance and quality control activities used by a monitoring organization depend on a number of local factors such as field and laboratory conditions, the objectives for monitoring, the level of data quality needed, the expertise of assigned personnel, the cost of control procedures, pollutant concentration levels, etc. Therefore, quality system requirements in section 2 of this appendix are specified in general terms to allow each monitoring organization to develop a quality system that is most efficient and effective for its own circumstances while achieving the data quality objectives described in this appendix."*

Based on these regulatory citations, the AQD and EPA Region VIII have agreed that the AQD will resume its historical quality oversight of industrial monitoring networks.

Plan to Implement Title 40 Part 58 Appendix A of the CFR Quality Assessments and Oversight

The following outlines the AQD's plans for industrial monitoring entities responsibilities and AQD and EPA Region VIII quality oversight responsibilities to ensure compliance with the requirements of Title 40 Part 58 of the CFR.

Primary Quality Assurance Organization

The Primary Quality Assurance Organization (PQAO) is defined in Title 40 Part 58 Appendix A of the CFR as

> *"a monitoring organization, a group of organizations or other organization that is responsible for a set of stations that monitor the same pollutant and for which data quality assessments can be pooled. Each criteria pollutant sampler/monitor at a monitoring station must be associated with one PQAO."*

Furthermore, Title 40 Part 58 Appendix A 1.2.1 of the CFR outlines the common factors that should be considered when defining a PQAO:

> *"a) Operation by a common team of field operators according to a common set of procedures;*
>
> *b) Use of a common quality assurance project plan (QAPP) or standard operating procedures;*
>
> *c) Common calibration facilities and standards;*
>
> *d) Oversight by a common quality assurance organization; and*
>
> *e) Support by a common management organization (i.e. state agency) or laboratory."*

Based on the definition and common factors, the AQD has determined at this time that it is most appropriate to continue to name the industrial facility, company or group of companies (known as "industrial monitoring entity" from here forward) as the PQAO for industrial monitoring networks. Each industrial monitoring entity may elect to operate its network and to perform quality control and quality assurance activities itself or through a contractor of its choosing. Each of these

entities therefore have common laboratory facilities, standards, QAPPs, data validation practices and management to some degree. In 2017, each industrial monitoring entity decided how to characterize their PQAO based on the criteria in Section 1.2.1, with assistance from the AQD and EPA. The AQD will keep the current industrial PQAO designations, and will continue to accept proposals from industrial monitoring entities who may wish to change their PQAO structure. AQD will forward the request to EPA Regional staff for approval if industrial monitoring entities request to combine PQAOs.

Coverage in Network Plans and Network Assessments

The AQD, through oversight of and cooperation with the industrial monitoring entity, will continue to include discussion of industrial monitoring networks in the AQD's Annual Network Plan to ensure monitors are meeting the requirements stated under Title 40 Part 58.10 of the CFR. The AQD will also include these networks in the 5-year Network Assessment due in 2020 and subsequent years, if necessary.

Annual Data Certification, Data Submittal, and Archiving Requirements

The industrial monitoring entity will be responsible for appropriate quarterly reporting of validated data to the AQD including:

1) AQS formatted "Raw Data" file including all required monitoring data for the facility;
2) AQS formatted "QA/QC file" including all precision checks and any performance audits conducted during the quarter;
3) Written quarterly data summary.

These quarterly reporting items, which include a certification by the Responsible Official or other authorized signatory, will be submitted to the AQD through the IMPACT portal no later than 60 days after the end of the quarter. The AQD will review the data and upload the raw and QA/QC data to AQS per Title 40 Part 58.16 of the CFR.

The industrial monitoring entity will be responsible for the Annual Data Certification, by letter to EPA Region VIII, per Title 40 Part 58.15 of the CFR. The AQD will provide necessary annual reports from AQS to the industrial monitoring entity through the IMPACT system.

Quality System Documentation

The AQD will have review and final approval authority over industrial PQAO QMP and QAPPs. The WDEQ has an approved Quality Management Plan (QMP) in place that allows the AQD to review and approve AQD's environmental data collection activities described and covered under QMPs and QAPPs. QMP and QAPP approval for industrial monitoring networks is already performed by the AQD to ensure individual facility compliance with permit conditions and therefore has a documented review system in place. Approved QMP/QAPPs will be supplied to EPA Region VIII per Title 40 Part 58 Appendix A 2.1.1 and 2.1.2 of the CFR.

Quality System Independence

The AQD plans for industrial monitoring entities to achieve quality independence through a combination of oversight by the AQD Quality Assurance Program and independent contracted performance evaluations as required by the National Performance Audit Program (NPAP) and Performance Evaluation Program (PEP), as well as performance audits preferably conducted by an organizationally independent individual. This combination will allow for consistent, qualified oversight with the appropriate levels of management separation. Details are in sections to follow.

Technical Systems Audit Program

The AQD will work to perform Technical Systems Audits on the industrial monitoring entities on the three-year or six-year schedule as specified in Title 40 Part 58 Appendix A of the CFR. The AQD has trained for these audits through a joint audit with Region VIII that took place in 2013 and will attend further Technical Systems Audit training at EPA's 2018 National Monitoring Conference.

PM Measurement Quality Checks

Flow rate verifications will be implemented by the industrial monitoring entity within the timeframe specified for the appropriate monitoring method, as will a semi-annual flow rate audit, which should (preferably) be performed by an organizationally independent individual. These items will be specified in the approved QAPP and reported to the AQD for upload into AQS.

Gaseous Measurement Quality Checks

One–point quality control checks will be implemented by the industrial monitoring entity as will an organizationally independent annual performance audit. These items will be specified in the approved QAPP and reported to the AQD for upload into AQS.

The implementation of the NPAP will be the responsibility of the industrial monitoring entity. Each entity will contract with EPA Region VIII's NPAP auditor or another certified auditor to audit their monitoring networks.

Meeting Probe and Path Siting Requirements

The AQD has worked with industrial monitoring entities during the siting process to ensure that probe and monitoring path siting requirements stated in Title 40 Part 58 Appendix E of the CFR are met. Probe and path criteria will be reevaluated during AQD Technical Systems Audits and whenever station relocations occur.

PM_{10} Collocation

Through its historical oversight role of industrial monitoring entities, the AQD has ensured that each network meets the collocation requirements for manual PM_{10} at the PQAO level per Title 40 Part 58 Appendix A 3.3.4 of the CFR.

Conclusion

The AQD has documented a straightforward and efficient plan, based on its decades of industrial monitoring oversight, which will ensure operations of the industrial monitoring network in a manner equivalent to the AQD ambient monitoring network. This proposal addresses the major requirements in the Revised Title 40 Part 58 of the CFR as well as considerations addressed in the OAQPS memo including data submittal and certification, quality system documentation, probe and path siting requirements, and measurement quality checks. This will allow facilities to continue to comply with their permit conditions to follow Part 58 and provide for sufficient regulatory oversight by the AQD. The AQD acknowledges that monitoring data collected at industrial monitoring networks under this proposal will require additional review by EPA Region VIII prior to the data's use in making future EPA regulatory decisions based on the Region's assessment of the data quality.

In the future, the AQD will consider options to adopt common QAPPs in addition to the existing quality oversight of industrial monitoring networks. In addition, the AQD will consider potential revisions to the WDEQ QMP for quality oversight of industrial monitoring networks, which may enhance quality assurance consistency. The AQD and EPA Region VIII will continue to explore other options for quality oversight of industrial monitoring networks.

5.2 SO_2 Data Requirements Rule

On September 21, 2015 the EPA's "Data Requirements Rule for the 2010 1-hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS)" (SO_2 DRR) became effective. This rule directs state agencies to "provide data to characterize current air quality in areas with large sources of sulfur dioxide (SO_2) emissions to identify maximum 1-hr SO_2 concentrations in ambient air (**80 FR 51052**). Characterization can be done through three different pathways: modeling, ambient monitoring, or emissions limitation. The AQD has delegated to the sources subject to the rule the responsibility to select and implement their selected characterization pathway. Table 46 lists the sources subject to this rule and their selected pathway.

Emissions Sources Subject to the Data Requirements Rule		Pathway Chosen to Satisfy Rule	
Company	**Facility**	**Model**	**Monitor**
Basin Electric	Laramie River Station	X	
Multiple	Campbell County Electric Generating Units	X	
Burlington Resources	Lost Cabin Gas Plant		X
PacifiCorp	Dave Johnston	X	X
PacifiCorp	Naughton	X	
PacifiCorp	Jim Bridger		X
Sinclair Wyoming Refining Company	Sinclair Refinery		X
Multiple	Trona Environmental Subcommittee (TES)		X

Table 46. DRR Pathway for all Affected Facilities and Emissions Groups in Wyoming

To comply with the rule, **Wyoming's 2016 Annual Network Plan** that was approved by EPA Region VIII on November 10, 2016 provided a detailed plan and justification of monitoring locations for those facilities that selected the monitoring pathway. The structure for quality oversight of the SO_2 DRR monitors can be found in **Appendix G of the 2017 Annual Network Plan**.

A summary of the data collected by these stations compared to the 2010 SO_2 NAAQS for 2015 to 2017 is provided in Table 47, below.

SO_2 Compliance with NAAQS of 75 ppb					
Annual 99% 1-hour average (ppb)				3-year 99% 1-hour average (ppb)	
Site Name	2015	2016	2017	Design Value (2015-2017)	In Compliance
Industrial DRR Stations					
Lost Cabin	N/A	N/A	65	N/A	N/A
Dave Johnston	N/A	N/A	14	N/A	N/A
Jim Bridger	31	35	16	27	Yes
Sinclair In-Town	2*	6	7	N/A	N/A
Sinclair Northeast	5*	15	12	N/A	N/A
Sinclair Southwest	N/A	N/A	30	N/A	N/A
TES 2	N/A	N/A	29	N/A	N/A
TES 4	N/A	N/A	20	N/A	N/A

Table 47. SO_2 1-hr NAAQS Comparison at DRR Sites

* - The value did not meet data completeness requirements per Title 40 Part 50 of the CFR.

5.2.1 Lost Cabin Gas Plant

The Lost Cabin Gas Plant air quality monitoring station began operations on January 1, 2017, and is being operated to satisfy the requirements of the SO_2 DRR. The station is located on an existing well pad approximately 0.4 miles south of the Lost Cabin Gas Plant facility in Fremont County. The station's objective is to characterize maximum 1-hr SO_2 impacts from the Lost Cabin Gas Plant, a facility subject to the DRR, and a SO_2 analyzer is located at this station.

Lost Cabin Monitoring Site Specifications							
Site Name	Location	AQS ID	Parameter	Instrument	Scale	Sample Frequency	Operational Status
Lost Cabin	43.272, -107.59891	56-013-0003	SO_2	Thermo 43i	Neighborhood	Continuous	No planned changes

Table 48. Lost Cabin Monitor Information

5.2.2 Dave Johnston Power Plant

The Dave Johnston Power Plant air quality monitoring station began operations on January 1, 2017, and is being operated to satisfy the requirements of the DRR. The station is located on state land approximately 4.3 miles south of the Dave Johnston Power Plant near Glenrock. The station's objective is to characterize maximum 1-hr SO_2 impacts from the Dave Johnston Power Plant, a facility subject to the DRR, and a SO_2 analyzer is located at this station.

Dave Johnston Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Dave Johnston	42.776122, -105.798214	56-009-0011	SO_2	API T100	Urban	Continuous	No planned changes

Table 49. Dave Johnston Power Plant Monitor Information

5.2.3 Jim Bridger Power Plant

The Jim Bridger Power Plant has an existing SO_2 monitoring station which has been used to satisfy the DRR. The station is located approximately 30 miles east of Rock Springs on County Route 15 in Sweetwater County, Wyoming. This station began operations on January 5, 2012. The station's objective is to characterize maximum 1-hr SO_2 impacts from the Jim Bridger Power Plant, a facility subject to the DRR, and a SO_2 analyzer is located at this station.

On January 13, 2017, Wyoming Governor Matt Mead recommended to EPA Region VIII to designate the Jim Bridger Power Plan in attainment based on 2013-2015 data. On January 9, 2018, the EPA published its final Round 3 designations for Wyoming in the Federal Register (**83 FR 1098**). All areas of Sweetwater County east of US Route 191, including the area surrounding the Jim Bridger Power Plant were designated as "Attainment/Unclassifiable". Because this area was designated under Round 3 of the DRR, the Jim Bridger Power Plant SO_2 monitor is no longer needed to make designations under Round 4 of the DRR in 2020. Therefore, the AQD is requesting that EPA Region VIII approve the discontinuation of this monitor pursuant to Title 40, Part 51.1203 (c) (3) of the CFR as part of its action on the 2018 Annual Network Plan. Documentation supporting this request was submitted to EPA Region VIII on April 9, 2018 and is also included in **Appendix G** of the 2018 Annual Network Plan.

Jim Bridger Monitoring Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Jim Bridger	41.74649, -108.80374	56-037-0020	SO_2	Teledyne-API 100E	Neighborhood	Continuous	Will be shut down upon EPA approval of the 2018 Network Plan

Table 50. Jim Bridger Power Plant Monitor Information

5.2.4 Sinclair Oil Refinery

The Sinclair Oil Refinery has an existing SO_2 monitoring network, which will be used to help satisfy the DRR. The Sinclair In-Town station is located about 0.2 miles west of the Sinclair Oil

Refinery facility with the objective of characterizing population exposure to SO_2 impacts within the Town of Sinclair. This station began operations on December 10, 2015. A SO_2 analyzer is located at this station. The Sinclair North East station is located directly north of the facility's fenceline with the objective of characterizing SO_2 impacts downwind of the facility. This station was relocated and began operations at the present site on December 18, 2015. There are SO_2 and NO_x analyzers located at this station. In addition to these existing sites, Sinclair installed another SO_2 monitor southwest of the facility, which began operations on January 1, 2017 and will be operated to satisfy the requirements of the DRR. The station is located at the Sinclair employee parking lot approximately 164 feet southwest of the facility. This station's objective is to characterize maximum 1-hr SO_2 impacts from the Sinclair Oil Refinery, a facility subject to the DRR, and a SO_2 analyzer is located at this station.

Sinclair Refinery Monitoring Network Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Sinclair In-Town	41.78258, -107.120916	56-007-0008	SO_2	Thermo 43i	Middle	Continuous	No planned changes
Sinclair North East	41.793638, -107.083083	56-007-0009	SO_2	API M-100E	Neighborhood	Continuous	No planned changes
Sinclair South Site	41.77866, -107.109	56-007-0010	SO_2	Thermo 43C	Middle	Continuous	No planned changes

Table 51. Sinclair Oil Refinery Monitor Information

5.2.5 Trona Environmental Subcommittee

The Trona Environmental Subcommittee (TES) consisting of; Genesis Alkali Wyoming Corporation (including the Westvaco and Granger Soda Ash Plants); Solvay Soda Ash Joint Venture and TATA Chemicals (Soda Ash) Partners began SO_2 network operations on January 1, 2017, and is being operated to satisfy the requirements of the DRR. Two monitoring stations are included within the network, one located on the ridge east of TATA and Westvaco, the other located between TATA and Westvaco. The network's objective is to characterize maximum 1-hr SO_2 impacts from the Green River Basin trona producing area. A SO_2 analyzer is located at each station.

Trona Environmental Subcommittee Monitoring Network Site Specifications							
Site Name	**Location**	**AQS ID**	**Parameter**	**Instrument**	**Scale**	**Sample Frequency**	**Operational Status**
Site 2	41.62993, -109.70166	56-037-0021	SO_2	Thermo 43i	Neighborhood	Continuous	No planned changes
Site 4	41.60436, -109.75456	56-037-0014	SO_2	Thermo 43i	Neighborhood	Continuous	No planned changes

Table 52. Trona Environmental Subcommittee Monitor Information

6.0 Future Ambient Monitoring Modifications

6.1 Cody Mobile

The AQD will soon deploy a mobile gaseous station to Cody, WY. The 2015 Network Assessment identified Cody as a possible future site location. Specifically, the finding stated that there is a need for population-based monitoring in all micropolitan statistical areas in the state.

Previously, this mobile station was located in Laramie, WY and was sited within the city limits. The siting of the Laramie Mobile station was chosen due to another finding in the 2015 Network Assessment that the city is close to a large Title V emissions source and is home to sensitive populations.

6.2 Jackson Mobile

The AQD will soon deploy a mobile gaseous station to Jackson, WY. The 2015 Network Assessment identified Jackson as a possible future site location. Specifically, the finding stated that there is a need for population-based monitoring in all micropolitan statistical areas in the state.

Previously, this mobile station was located in Casper, WY and was sited within the city limits. The siting of the Casper Mobile station was chosen as part of an ongoing study of ambient air and meteorological conditions near local refineries.

6.3 Eastern Johnson County

The AQD is decommissioning the Campbell County station due to results from the 2015 Network Assessment. Components of the Campbell County station will be used to establish an ambient monitoring station in Eastern Johnson County between Buffalo and Gillette. An initial siting trip to Johnson County to determine an appropriate location was conducted in 2017. Further, a land use agreement has been signed and access to electricity has also been established at this new location. It is expected that the new site will be operable in May 2018.

6.4 Saratoga BAM

The AQD will deploy the mobile BAM station to Saratoga, WY later in the summer of 2018. Presently, there is no particulate matter ambient monitoring in Carbon County. Recent analyses indicated particulate matter emissions in the vicinity coupled with industrial activities.

Additionally, Saratoga is located a few miles west of the Medicine Bow National Forest, a source for active prescribed burns and occasional wildfire activity.

7.0 Conclusion

As required by Title 40, Part 58.10(a) of the CFR, the AQD has completed its 2018 Annual Network Plan. The 2018 Annual Network Plan demonstrates sufficient coverage throughout Wyoming. As population and industrial concerns change, the AQD strives to verify that the monitoring needs of Wyoming are satisfied.

Data collected at the AQD's monitoring stations through 2017 shows that all monitors are attaining the NAAQS for PM_{10}, $PM_{2.5}$, NO_2, SO_2, O_3, and CO. Further, the operation of each monitoring site has met the requirements of Title 40, Part 58 Appendices A-E.

The AQD continually evaluates data collected at the AQD, industrial, and AQRV monitors to determine if changes in policy are needed to continue managing the air resource in Wyoming.

Any comments pertaining to the Wyoming Ambient Air Monitoring 2018 Annual Network Plan should be sent to the following contact:

Ms. Cara Keslar
Monitoring Section Supervisor
Wyoming Air Quality Division
200 West 17th Street
Cheyenne, WY 82002

Appendix A: AQD Monitoring Site Metadata

AQS ID	Site Name	Address	Land Use Type	Location Type	Monitor Type	Meets 40 CFR § 58 Appendix A, C, D & E Requirements*	Monitor Objective	Longitude	Latitude	Site Start Date
56-025-0001	Casper	City County Bldg. – Center & C Streets	Commercial	Urban & Center City	SLAMS	X	Population Exposure	-106.32509	42.85106	10/15/1998
56-021-0001	Cheyenne	Emerson Bldg. 23rd & Central Ave.	Residential	Urban & Center City	SLAMS	X	Population Exposure	-104.81766	41.13687	1/1/1979
56-029-0001	Cody	1225 10th St.	Residential	Suburban	SLAMS	X	Population Exposure	-109.06851	44.52464	1/1/1975
56-005-1002	Gillette	1000 W. 8th St.	Commercial	Urban & Center City	SLAMS	X	Population Exposure	-105.51702	44.28801	1/1/1978
56-039-1006	Jackson	40 E. Pearl Ave.	Commercial	Urban & Center City	SLAMS	X	Population Exposure	-110.79799	43.45776	6/8/2007
56-013-1003	Lander	600 Washington	Residential	Suburban	SLAMS	X	Population Exposure	-108.73556	42.84223	1/1/1987
56-001-0006	Laramie	406 Ivinson	Commercial	Urban & Center City	SLAMS	X	Population Exposure	-105.59173	41.31159	1/1/1968
56-037-0007	Rock Springs	625 Ahsay Ave.	Residential	Urban & Center City	SLAMS	X	Population Exposure	-109.22013	41.59259	1/1/1983
56-033-1003	Sheridan Meadowlark	1410 DeSmet Ave.	Commercial	Urban & Center City	SLAMS	X	Population Exposure	-106.96432	44.78275	7/1/2012
56-033-0002	Sheridan – Police Station	45 West 12th St.	Commercial	Urban & Center City	SLAMS	X	Highest Concentration, Population Exposure	-106.95593	44.81514	10/5/1983
56-009-0009	Antelope Site 7 (PRB Network)	Antelope Site 7	Industrial	Rural	SPM	X	General/Background	-105.38857	43.42542	2/18/2015
56-005-0892	Belle Ayr BA-4 (PRB Network)	Belle Ayr BA-4	Industrial	Rural	SPM	X	Highest Concentration, Source Oriented	-105.34316	44.09707	7/9/1991
56-035-0700	Big Piney	4 miles south of Big Piney, WY	Residential	Rural	SPM	X	Source Oriented, General/Background	-110.09890	42.48640	3/30/2011
56-005-0891	Black Thunder BTM-36-2 (PRB Network)	BTM-36-2 (Black Thunder Mine)	Industrial	Rural	SPM	X	Source Oriented	-105.21330	43.64830	1/1/1985

AQS ID	Site Name	Address	Land Use Type	Location Type	Monitor Type	Meets 40 CFR § 58 Appendix A, C, D & E Requirements*	Monitor Objective	Longitude	Latitude	Site Start Date
56-035-0099	Boulder	5 miles SW of Boulder, WY	Desert	Rural	SPM	X	Source Oriented, Highest Concentration	-109.75300	42.71900	2/1/2005
56-005-1899	Buckskin Mine (PRB Network)	Triton Coal Gillette, WY	Industrial	Rural	SPM	X	Source Oriented	-105.53976	44.50268	9/4/2008
56-005-0456	Campbell County	15 miles SSW of Gillette, WY	Industrial	Rural	SPM	X	Source Oriented, General/Background	-105.52999	44.14696	7/15/2003
56-025-0100	Casper Gaseous	2800 Pheasant Dr. Casper, WY	Commercial	Urban & Center City	SPM	X	Population Exposure	-106.36501	42.82231	3/1/2013
56-025-0005	Casper Mobile	500 S. Walsh Dr.	Residential	Suburban	SPM	X	Population Exposure	-106.27767	42.84630	12/1/2016
56-021-0100	Cheyenne NCore	6909 Washakie Ave.	Residential	Suburban	NCore	X	National Core Monitoring Site	-104.77842	41.18235	1/1/2011
56-009-0010	Converse County	16 miles west of WY Highway 59 on Highland Loop Rd.	Industrial	Rural	SPM	X	General/Background	-105.49896	43.10108	4/10/2015
56-035-0100	Daniel South	5 miles south of Daniel, WY	Desert	Rural	SPM	X	General/Background	-110.05510	42.79070	7/1/2015
56-037-0077	Hiawatha	Bitter Creek Rd. 43 miles SE of Rock Springs, WY	Desert	Rural	SPM	X	General/Background	-108.61900	41.15800	3/30/2011
56-035-1002	Juel Spring	20 miles NW of Farson, WY	Desert	Rural	SPM	X	Source Oriented, General/Background	-109.56050	42.37350	12/11/2009
56-001-0010	Laramie Mobile	998 Russell St., Laramie, WY	Residential	Suburban	SPM	X	Population Exposure	-105.586	41.30283056	4/5/2017
56-037-0300	Moxa Arch	25 miles NW of Green River, WY	Desert	Rural	SPM	X	Source Oriented	-109.78833	41.75056	5/27/2010
56-041-0101	Murphy Ridge	Bear River, WY	Agricultural	Rural	SPM	X	General/Background	-111.04238	41.37300	1/1/2007
56-035-0101	Pinedale Gaseous	West side of City Park & Pine Creek	Residential	Suburban	SPM	X	Population Exposure	-109.87076	42.86982	1/1/2009

AQS ID	Site Name	Address	Land Use Type	Location Type	Monitor Type	Meets 40 CFR § 58 Appendix A, C, D & E Requirements*	Monitor Objective	Longitude	Latitude	Site Start Date
56-037-0300	Moxa Arch	25 miles NW of Green River, WY	Desert	Rural	SPM	X	Source Oriented	-109.78833	41.75056	5/27/2010
56-041-0101	Murphy Ridge	Bear River, WY	Agricultural	Rural	SPM	X	General/Background	-111.04238	41.37300	1/1/2007
56-035-0101	Pinedale Gaseous	West side of City Park & Pine Creek	Residential	Suburban	SPM	X	Population Exposure	-109.87076	42.86982	1/1/2009
56-033-0006	Sheridan Mobile	500 Lewis St., Sheridan, WY	Residential	Urban & Center City	SPM	X	Population Exposure	-106.961763	44.80353	8/31/2017
56-013-0099	South Pass	South Pass, WY	Forest	Rural	SPM	X	General/Background	-108.72000	42.53000	3/12/2007
56-005-0123	Thunder Basin	30 miles NNE of Gillette, WY	Desert	Rural	SPM	X	General/Background	-105.29030	44.65220	5/1/2001
56-037-0200	Wamsutter	2 miles west of Wamsutter, WY	Desert	Rural	SPM	X	Source Oriented, General/Background	-108.02458	41.67745	3/1/2006
NOT IN AQS	Wheatland BAM Station	West Mariposa Parkway & 27th St.	Residential	Rural	SPM	X	Population Exposure	-104.9786	42.0481	2/7/2017
56-005-0099	Wright Jr-Sr High School	Adjacent to Wright Jr-Sr High School	Residential	Rural	SPM	X	General/Background, Population Exposure	-105.49149	43.75615	11/1/2002

Table 53. Metadata for Current AQD Sites

Appendix B: 2017 SLAMS Precision and Accuracy

$PM_{2.5}$

AQS ID	POC	Site Name	Precision Checks (Number-Type)	Accuracy Audit				Flow Verification			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
56-021-0100	POC-1	Cheyenne NCore	0	1	0	1	0	3	3	3	3
	POC-11		0	1	0	1	0	3	3	3	3
	POC-2		0	1	0	1	0	3	3	3	3
	POC-3		57 – Analytical 12 – Flow Rate	1	0	1	0	3	3	3	3
56-021-0001	POC-1	Cheyenne SLAMS	30 - Analytical	0	1	0	1	3	3	3	3
	POC-11		0	0	1	0	1	3	3	4	3
	POC-2		0	0	1	0	1	3	3	3	3
56-025-0001	POC-1	Casper SLAMS	0	0	1	1	0	3	3	3	3
	POC-11		0	0	1	1	0	3	3	3	3
56-039-1006	POC-1	Jackson SLAMS	0	0	1	0	1	3	3	3	3
	POC-11		0	0	1	0	1	3	3	3	3
56-029-0001	POC-1	Cody SLAMS	0	0	1	0	1	3	3	3	3
	POC-11		0	0	1	0	1	3	3	3	3
56-013-1003	POC-1	Lander SLAMS	0	0	1	0	1	3	3	3	3
	POC-11		0	0	1	0	1	3	3	3	3
56-001-0006	POC-1	Laramie SLAMS	0	0	1	0	1	3	4	3	2
	POC-11		0	0	1	0	1	3	4	3	2
56-037-0007	POC-1	Rock Springs SLAMS	0	0	1	1	0	3	3	3	3
	POC-11		0	0	1	1	0	3	3	3	3
56-033-0002	POC-1	Sheridan Police Station SLAMS	22 - Analytical	1	0	1	0	3	3	3	3
	POC-11		0	1	0	1	0	4	3	3	4
	POC-2		0	1	0	1	0	3	3	4	3
56-033-1003	POC-1	Sheridan Meadowlark School SLAMS	0	1	0	1	0	3	4	3	3
	POC-11		0	1	0	1	0	3	3	3	3

Table 54. $PM_{2.5}$ SLAMS Precision and Accuracy

PM_{10}

AQS ID	POC	Site Name	Precision Checks (Number-Type)	Accuracy Audit				Flow Verification			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
56-025-0001	POC-4	Casper SLAMS	29 – Analytical	0	1	0	1	3	3	3	3
	POC-5		0	0	1	0	1	3	3	3	3
	POC-44		0	0	1	0	1	3	3	3	3
56-021-0001	POC-1	Cheyenne SLAMS	30 – Analytical	0	1	0	1	4	3	3	3
	POC-11		0	0	1	0	1	3	3	3	3
	POC-2		0	0	1	0	1	4	3	3	3
56-021-0100	POC-3	Cheyenne NCore	0	1	0	1	0	3	3	3	3
56-029-0001	POC-3	Cody SLAMS	0	1	0	1	0	3	3	3	3
	POC-33		0	1	0	1	0	3	3	3	3
56-005-1002	POC-5	Gillette SLAMS	0	1	0	1	0	3	3	3	3
56-039-1006	POC-1	Jackson SLAMS	0	0	1	0	1	3	3	3	3
	POC-11		0	0	1	0	1	3	3	3	3
56-013-1003	POC-3	Lander SLAMS	0	0	1	0	1	3	3	3	3
	POC-33		0	0	1	0	1	3	3	3	3
56-001-0006	POC-5	Laramie SLAMS	0	1	1	0	0	4	3	3	2
	POC-55		0	1	1	0	0	3	3	3	2
56-037-0007	POC-2	Rock Springs SLAMS	0	1	0	1	0	3	3	3	3
	POC-22		0	1	0	1	0	3	3	3	3
56-033-0002	POC-1	Sheridan Police Station SLAMS	0	1	0	1	0	3	3	3	4
56-033-1003	POC-1	Sheridan Meadowlark School SLAMS	28 – Analytical	0	1	0	1	3	3	3	3
	POC-11		0	0	1	0	1	3	3	3	3
	POC-2		0	0	1	0	1	3	3	3	3

Table 55. PM_{10} SLAMS Precision and Accuracy

Appendix C: Casper Gaseous Ozone SLAMS Correspondence from the AQD to the EPA

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

DEQ

Matthew H. Mead, Governor

Todd Parfitt, Director

December 14, 2016

Mr. Albion Carlson
EPA-Air Monitoring Section
1595 Wynkoop Street
Denver, CO 80202-1129

Re: Request Approval for Redesignation of the Casper SPM O_3 to SLAMS O_3 monitor.

Dear Mr. Carlson:

The Wyoming Department of Environmental Quality – Air Quality Division (WDEQ-AQD) is seeking approval to redesignate the Casper ozone (O_3) monitor type from Special Purpose Monitors (SPM) to State and Local Monitoring Station (SLAMS). The Casper SPM O_3 monitor is currently located in the foothills of Casper Mountain in Casper, Wyoming. During the WDEQ-AQD's 2016 Technical System Audit (TSA), the Environmental Protection Agency (EPA) Region 8 issued a draft finding that the ozone monitor at Casper should be redesignated from an SPM to SLAMS monitor type, based on the 3-year ozone (2014, 2015, and 2016) design value of 0.060.

The existing Casper SPM (56-025-0100) site was established at 2800 Pheasant Drive Casper, Wyoming (coordinates 42°49'18.75 N, 106°21'49.79 W) in March 2013. The Casper SPM fulfilled a finding in the 2010 Network assessment regarding the need for population –based O_3 monitoring in Casper, Wyoming's second largest city. Casper is a city and metropolitan statistical area (MSA) of approximately 56,000 people and would meet the SLAMS minimum ozone monitoring requirements found in 40CFR part 58 Appendix D, Table D-2.

This site represents a neighborhood scale, population oriented station. A current list of the Casper current SPM parameters operating at the site, redesignated O_3 SLAMS parameters listing, regional scale map, and site map are included in the following attachments. All 40CFR58, Appendix D siting criteria is reasonably met.

Listed below is a summary of attachments for this request of redesignation:

Attachment 1:	Casper - SPM – Parameter List
Attachment 2:	Casper - SLAMS- Parameter List
Attachment 3:	Regional Map of Casper Existing SPM and Proposed SLAMS Site
Attachment 4:	Site Map of Casper, Wyoming Existing and Proposed SLAMS Site
Attachment 5:	Region 8 Network Modification Request Form

200 West 17th Street · Cheyenne, WY 82002 · http://deq.wyoming.gov · Fax (307)635-1784

ADMIN/OUTREACH (307) 777-7937 | ABANDONED MINES (307) 777-6145 | AIR QUALITY (307) 777-7391 | INDUSTRIAL SITING (307) 777-7369 | LAND QUALITY (307) 777-7756 | SOLID & HAZ. WASTE (307) 777-7752 | WATER QUALITY (307) 777-7781

Since all requirements and logistical factors are favorable for this site, the WDEQ-AQD is seeking Region 8's approval on the redesignation of the Casper SPM to SLAMS for the population –based O3 SLAMS site in Casper to meet O_3 monitoring requirements outlined in 40CFR58 Appendix D. As part of this process, the details of the redesignation of the Casper station will be officially addressed in the 2017 Annual Monitoring Network Plan. The AQD welcomes your consideration of our request and looks forward to your response. Please direct any questions to Mark Gagen (307-777-7351) or Cara Keslar (307-777-8684).

Sincerely,

Mark Gagen
CEMS Coordinator
WDEQ-AQD

Enclosure (1)
cc: Cara Keslar, Monitoring Section Supervisor
Darla Potter, AQRM Program Manager
SLAMS File

Attachment 1- Casper, Wyoming SPM Site

Casper SPM – Parameter List	
Parameter	Sampler
O3	Teledyne-API/ Model T400
NO/NO2/NOX	Teledyne-API/ Model T200
Particulate Matter < 10 microns (filter)	Metone BAM
Meteorology	RM Young Wind Monitor AQ, RM Young 41342 power aspirated temperature probes (2 and 10 m), Met One 8" heated tipping bucket, Epply 095 solar radiation sensor, Vaisala CS106 barometric pressure sensor.

Attachment 2 - Casper, Wyoming SLAMS

Casper SLAMS– Parameter List	
Parameter	Sampler
O3	Teledyne-API/ Model T400

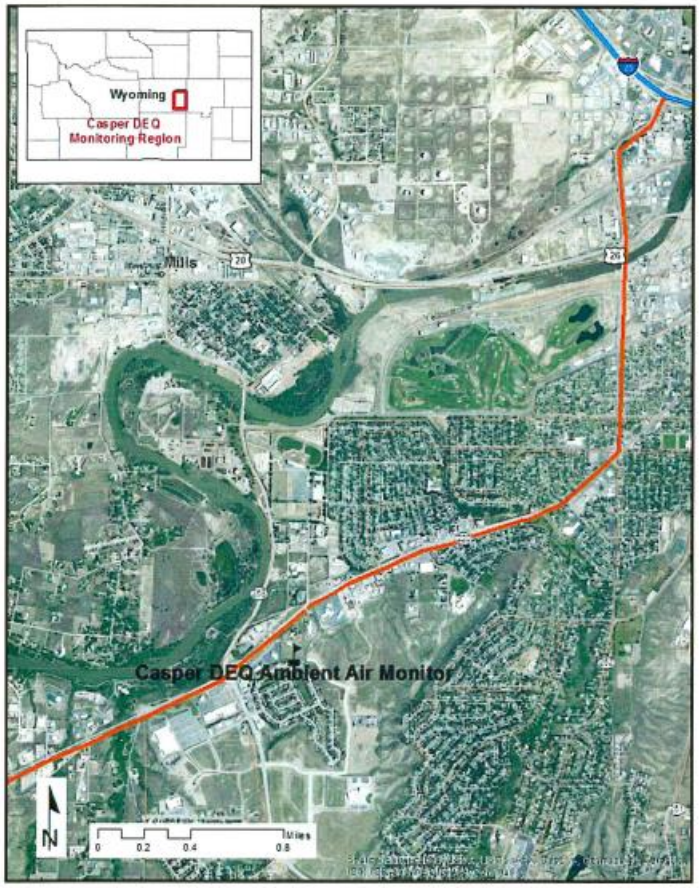
Attachment 3

Map of Casper, Wyoming Existing and Proposed SLAMS Site -Regional Map (5-30 Miles)

Attachment 4

Map of Casper, Wyoming Existing and Proposed SLAMS Site –Site Map (1/4 – 1 mile)

WYDEQ Casper Ambient Air Monitoring Location



Attachment 5 - Region 8 Network Modification Request Form

State of Wyoming Ambient Air Monitoring Site Modification Form (Version 1, 12-2011)

DATE: 01/01/2017	CITY: Casper	STATE: Wyoming
AQS SITE ID: 56-025-0100	SITE NAME: Casper_O3_SLAMS	

PROPOSED MODIFICATION/REASON WHY/SITE OBJECTIVE:
To monitor ozone parameters in Wyoming's largest City.

AIR QUALITY PARAMETER (PM10, SO2, CO, NO2, ETC.)	MONITOR TYPE (NAMS, SLAMS, SPM, TRIBAL, etc.)	CHECK ONE OR MORE OF THE APPLICABLE CATEGORIES BELOW:				LIST SAMPLER EQUIPMENT
		MAX CONC	SOURCE IMPACT	POPULATION EXPOSURE	BACKGROUND	
O3	SLAMS			✓		Teledyne T400

PROPOSED SAMPLING START OR REMOVAL DATE OR DATE STARTED OR REMOVED: March 1, 2013

ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:

LOCATION (LAT./LONG. OR UTM=S): Lat. 42 49'18.75" N Long. -106 21'49.79"W

SITE ELEVATION (M. MSL): 1591 m — PROBE HEIGHT (M. AGL):

DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS
28.3 m	South	77.2 m	North	3 m	Building
		28.3 m	South	5.5 m	Trees

UNRESTRICTED AIR FLOW: ✓ >270 DEG. ☐ >180 DEG. <CRITERIA_____DEG.

DISTANCE TO INTERSECTIONS (M): 380 m — DISTANCE FROM SUPPORTING STRUCTURES (M): VERT. 6.1 m HORIZ. 43.6 m

DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
189 m	CY Ave	NORTH	26,274	2012	Paved Highway	
147 m	Pheasant Dr	EAST	No Data	No Data	Residential St	
71 m	Meadowlark Dr	SOUTH	3,163	2012	Residential St	
191 m	CY Ave	WEST	26,274	2012	Paved Highway	

DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)	DIRECTION TO AREA SOURCES	COMMENTS
2 Miles	North	2 Miles	North	Black Hills Bentonite

CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except as noted with submittal.

Printed Name:_____ Signature:_____

FOR EPA USE ONLY: Received Date:_____ Follow-up Actions:_____ Approval Status Given:_____ Email Response Date:_____ Letter Response Date:_____

FOR METEOROLOGICAL PARAMETERS ONLY:

MONITORING PURPOSE/OBJECTIVES:
To monitor ozone parameter in Wyoming's 2nd largest City.

PROPOSED MONITORING SCHEDULE/DURATION: Continuous

PROPOSED START/REMOVAL DATE OR DATE STARTED/REMOVED: January 1, 2017

DATA ACQUISITION SYSTEM:

PRIMARY: CSI CR3000

BACKUP

EQUIPMENT MANUFACTURER/MODEL:
RM Young Wind Monitor AQ, RM Young 41342 power aspirated temperature probes (2 and 10 m), Met One 8" heated tipping bucket, Epply 09E solar radiation sensor, Vaisala CS106

WILL THE DATA BE USED FOR MODELING?	YES ○	NO ◉
IS SITE REQUIRED FOR SIP?	YES ○	NO ◉
UNRESTRICTED AIRFLOW?	YES ◉	NO ○

DISTANCE TO TREE DRIPLINE (M): 28.37 m

NEARBY TERRAIN: SMOOTH | ROLLING | ROUGH

PARAMETERS:	APPLICABLE √ those that apply	SENSOR HT (M)
WINDSPEED/DIRECTION	✓	10 m
SOLAR RADIATION	✓	2 m
RELATIVE HUMIDITY		
PRESSURE	✓	1.5 m
SIGMA THETA	✓	10 m
PRECIPITATION	✓	1 m
TEMPERATURE	✓	2 m,10 m
OTHER (DESCRIBE)		

TOPOGRAPHIC FEATURES (E.G HILLS, MOUNTAINS, VALLEYS, RIDGES, BODIES OF WATER):
The monitor is located in the foothills of Casper Mountain.

COMMENTS:

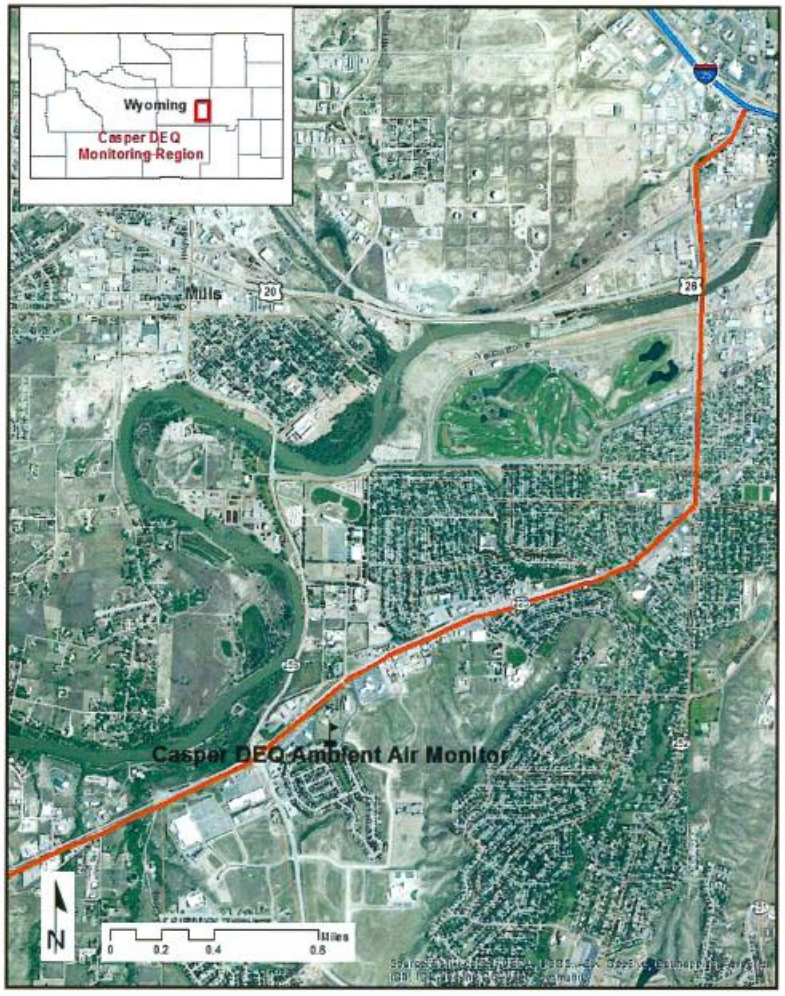
Regional Map (5-30 miles) with sources, sites, traffic, and wind.

WYDEQ Casper Ambient Air Monitoring Location

3

Site Map (1/4-1 mile) with sources, sites, traffic, and wind.

WYDEQ Casper Ambient Air Monitoring Location



4

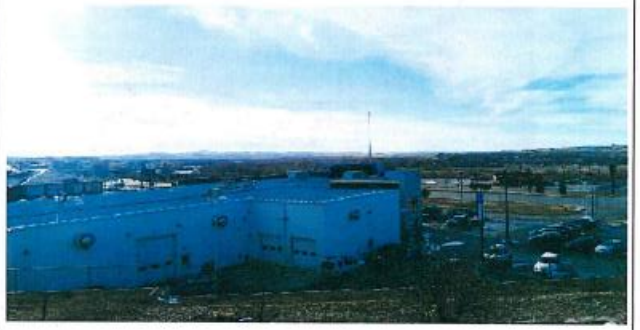
Photographs:	Site: Casper	Location: 2800 Pheasant Dr Casper WY	Date: 3/12/13

NORTH

EAST

SOUTH

WEST



Photographs:	Site: Casper	Location: 2800 Pheasant Casper WY	Date: 3/12/13
Obstacle or source direction from site: North		Obstacle or source direction from site: South	
			
Obstacle or source direction from site:		Obstacle or source direction from site:	

Appendix D: Casper Gaseous Ozone SLAMS Redesignation Correspondence

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
www.epa.gov/region8

DEC 06 2017

Ref: 8P-AR

RECEIVED
DEC 11 2017
AIR QUALITY DIVISION

Ms. Nancy E. Vehr
Administrator, Air Quality Division
Department of Environmental Quality
200 West 17th Street
Cheyenne, Wyoming 82002

Re: Response to Network Modification Request Dated December 14, 2016

Dear Ms. Vehr:

We received a Network Modification Request Form (NMRF) from your office in a letter emailed and dated December 14, 2016. The table below summarizes the proposed change that has been requested, including the date of the request, the common name of the air monitoring station, the Air Quality System (AQS) identification number, the affected parameters, and the type of change proposed.

Date	Location & Common Name	AQS Identification Number	Affected Parameters	Type of Change
12/14/2016	Casper	56-025-0100	O_3	Monitor Type Redesignation

During the 2016 Technical Systems Audit of the ambient air monitoring program operated by the Wyoming Department of Environmental Quality's Air Quality Division, Region 8 found that the ozone monitor located at the Casper site should be redesignated from its Special Purpose Monitor (SPM) type designation to a State and Local Monitoring Station (SLAMS) type designation. The finding was based on the 3-year (2014, 2015, and 2016) ozone design value of 0.060 for the Casper metropolitan statistical area which meets the SLAMS minimum ozone requirements outlined at 40 CFR part 58 appendix D, Table 2. To comply with the requirements, the state has requested approval from the EPA to redesignate the Casper ozone SPM monitor as an Ozone SLAMS monitor. The details of the redesignation will be addressed in the Annual Monitoring Network Plan.

We concur with this network modification request and appreciate the submittal of the NMRF discussed above. Please ensure that when changing the monitor type assignment from SPM to SLAMS in AQS, the respective monitoring stop and start dates are also entered into AQS and that the site metadata in AQS is updated.

If you have any questions on this issue, please contact me at (303) 312-6936, or your staff may contact Albion Carlson, of my staff, at (303) 312-6207.

Sincerely,

Monica S. Morales
Director, Air Program
Office of Partnerships and Regulatory Assistance

cc: Cara Keslar WY DEQ
Mark Gagen WY DEQ

Appendix E: Cody Analyses

Wyoming Department of Environmental Quality
Air Quality Division
Memorandum

To: Nancy E. Vehr, Air Quality Administrator 2-5-18

Through: Darla Potter, Air Quality Resource Management Program Manager 2/2/18
Cara Keslar, Monitoring Section Supervisor CK 2/5/18

From: Daniel Sharon, Monitoring Project Manager D.S. 2/1/18

Cc: Greg Meeker, District 4 Engineer

Date: February 2, 2018

Subject: Wyoming Department of Environmental Quality, Air Quality Division
Cody Analysis to Support 2015 Network Assessment

I. Background

The Air Quality Division's (AQD) 2015 Network Assessment included a finding that further analyses were required to evaluate the need for gaseous monitoring in all previously un-monitored micropolitan statistical areas in the state, including the city of Cody. The language from the Network Assessment is as follows:

"***Section 4.2.6 Gaseous Monitoring for All Micropolitan Statistical Areas***

The AQD would like to conduct further analyses to determine the need for monitoring for gaseous pollutants in all micropolitan statistical areas in the state, in addition to those areas previously identified. These analyses would include emissions inventories for adjacent states, additional HYSPLIT trajectory analyses, and a review of all existing and previous monitoring data.

Other micropolitan areas or cities with at least 9,500 people to study would include Jackson (Teton County), Cody (Park County), and Evanston (Uinta County)."

The following analysis fulfills this data need for the city of Cody by reviewing all existing gaseous monitoring data in the area, analyzing Idaho and Montana's Emissions Inventories to identify large sources of gaseous pollutants proximate to or upwind of the city, and presenting HYSPLIT forward-trajectory modeling runs from these sources to determine if pollutants from these sources are expected to impact the area.

II. Meteorological Information

Wind Speed and Wind Direction information were collected from the Yellowstone Regional Airport (KCOD) meteorological station, located in the southeast portion of the city of Cody. The location of this station is displayed in Figure 1, below.

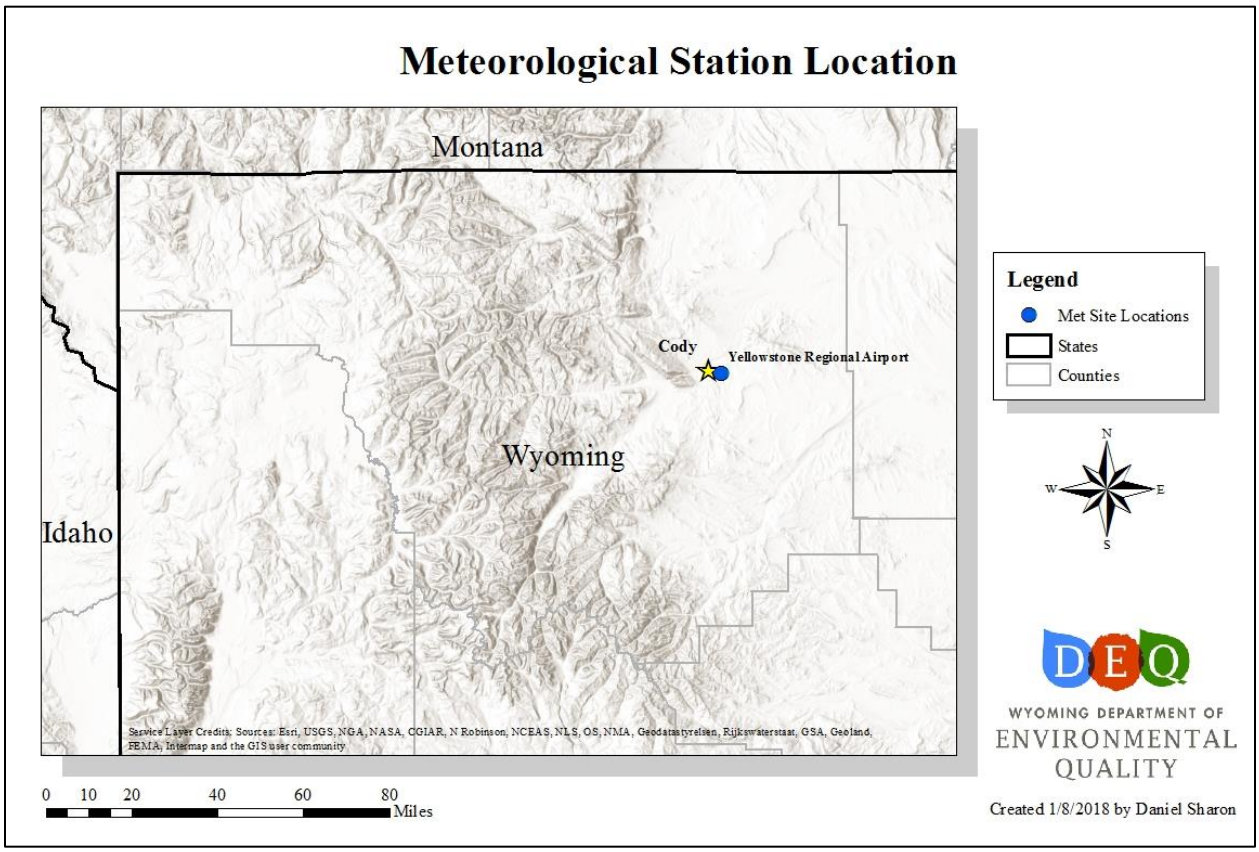


Figure 1. Yellowstone Regional Airport Meteorological Station Location

A wind rose was generated for this station for the monitoring period of 2015-2017 (the most recent three-year period of available data for the site). The wind rose is displayed in Figure 2, below.

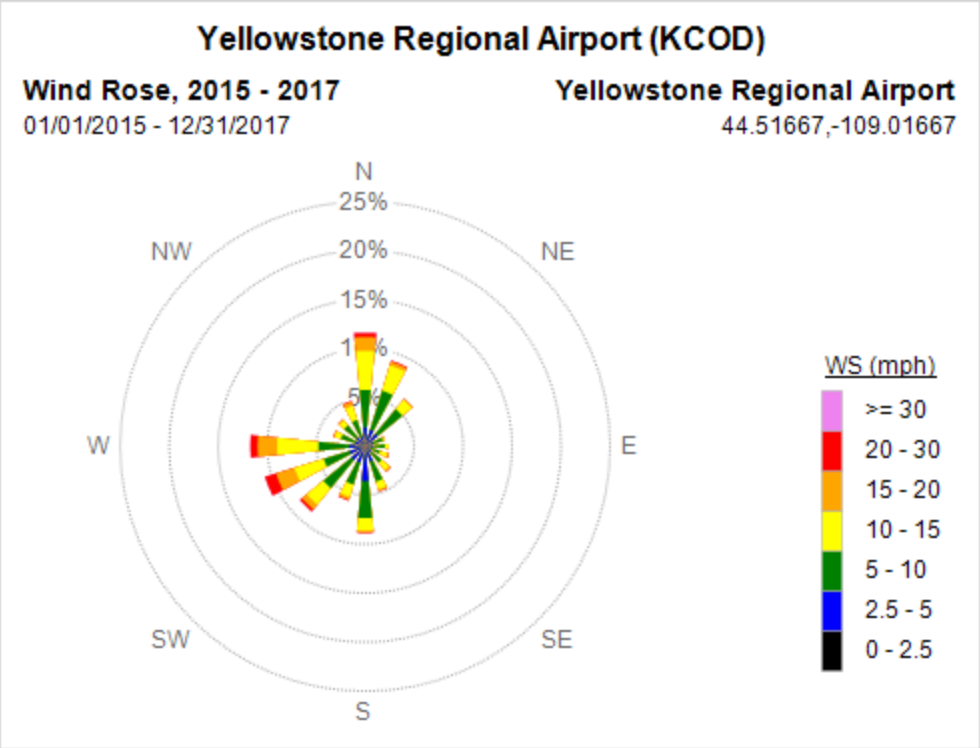


Figure 2. Yellowstone Regional Airport 2015-2017 Wind Rose

Based on this figure, winds in the Cody area generally have a WSW/NNE bimodal character. Based on the Yellowstone Regional Airport data, the strongest winds in the Cody area are expected out of the WSW and W, while winds are most likely to occur out of the W and N. This indicates that the states of Montana and Idaho are most likely to have an impact on Cody air quality, outside of influences from the state of Wyoming itself from the west and north. The Montana counties most likely to have an impact on Cody air quality are Carbon, Stillwater, Yellowstone, Big Horn, and Gallatin, which are directly upwind of the city. The Idaho counties most likely to have an impact on Cody air quality are Fremont, Madison, and Teton, which are directly upwind of the city with WSW and SW winds.

III. Existing Monitoring Data

According to the Environmental Protection Agency's (EPA) Air Quality System (AQS) database, during the period of 1990 to 2017 there has been no reported NAAQS-pollutant gaseous monitoring in the entirety of Park County. However, there is a monitoring station located approximately 20 miles northwest of Cody that collected aerosol speciation data as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. The location of this station is shown in Figure 3 and site details are summarized in Table 1, below.

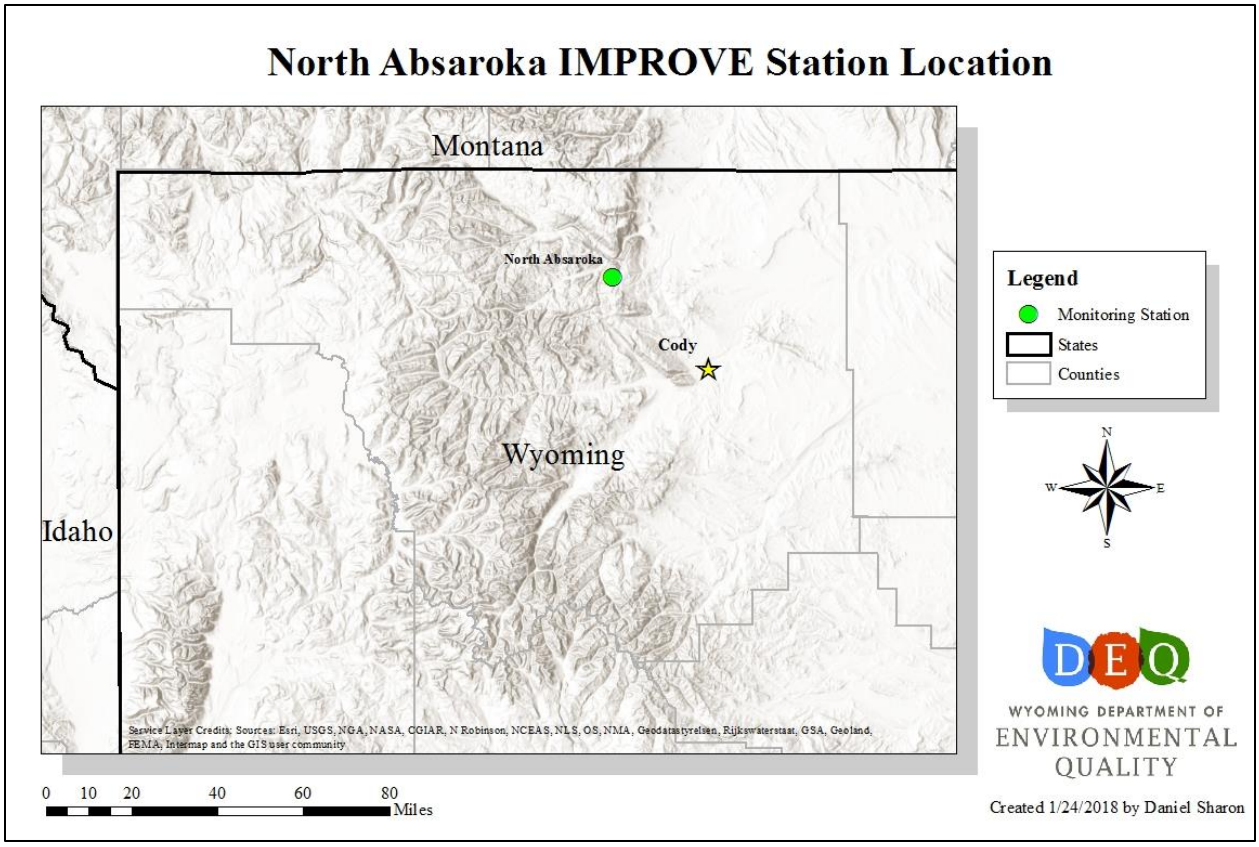


Figure 3. North Absaroka IMPROVE Station Location

Site Name	North Absaroka (NOAB1)
Operating Agency	United States Forest Service
Monitor Type	IMPROVE
Site ID	56-029-9002
Latitude/Longitude	44.7448,-109.3816

Table 1. North Absaroka IMPROVE Station Information

The objective of the IMPROVE network is to monitor visibility and aerosol concentrations in and near Class I areas across the United States. While not directly related to NAAQS criteria pollutant concentrations, a review of aerosol species concentrations was performed as a general indication of pollution levels in the area.

The North Absaroka station began operations on January 26, 2000 and continues to operate at the current time. A review of the aerosol data provided on the Federal Land Manager Environmental Database website (http://views.cira.colostate.edu/fed/) for this station indicated a general long-term improvement in visibility from 2000 to 2016 (the most recent available data), with near-pristine

visibility on the clearest days. Figures 4 and 5[1], below, summarize the overall decrease in North Absaroka's Haze Index (measured in deciview (dv) units) on the clearest and haziest days, respectively. A review of aerosol species data for this station generally indicated no long-term trends, though most species demonstrated distinct seasonal patterns in concentration levels, with higher concentrations generally occurring in late summer.

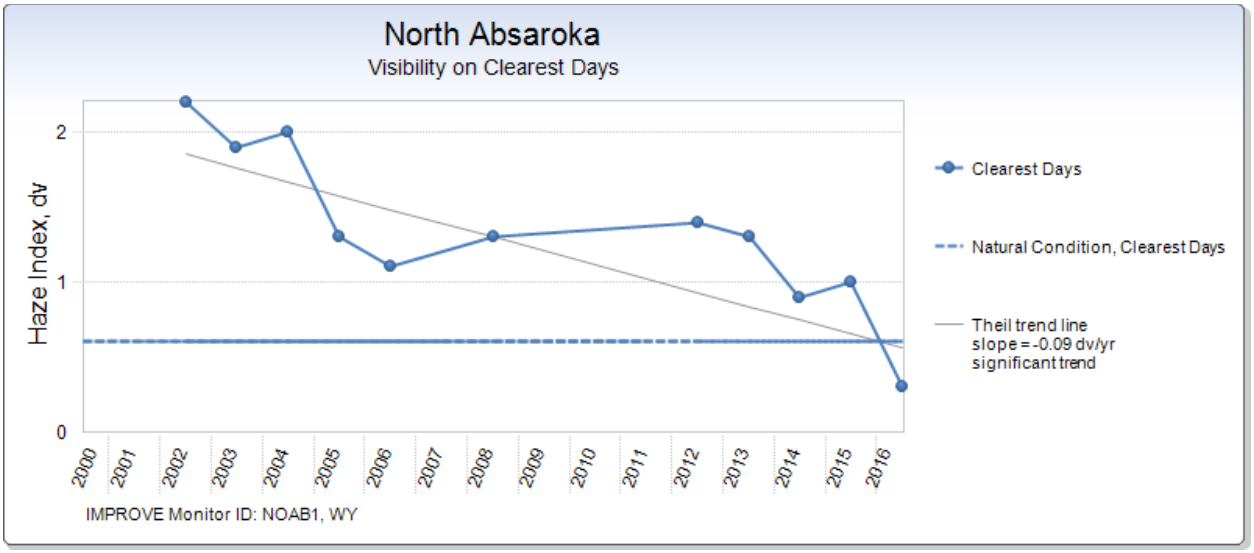


Figure 4. North Absaroka IMPROVE Station Visibility Trends on Clearest Days, 2000-2016

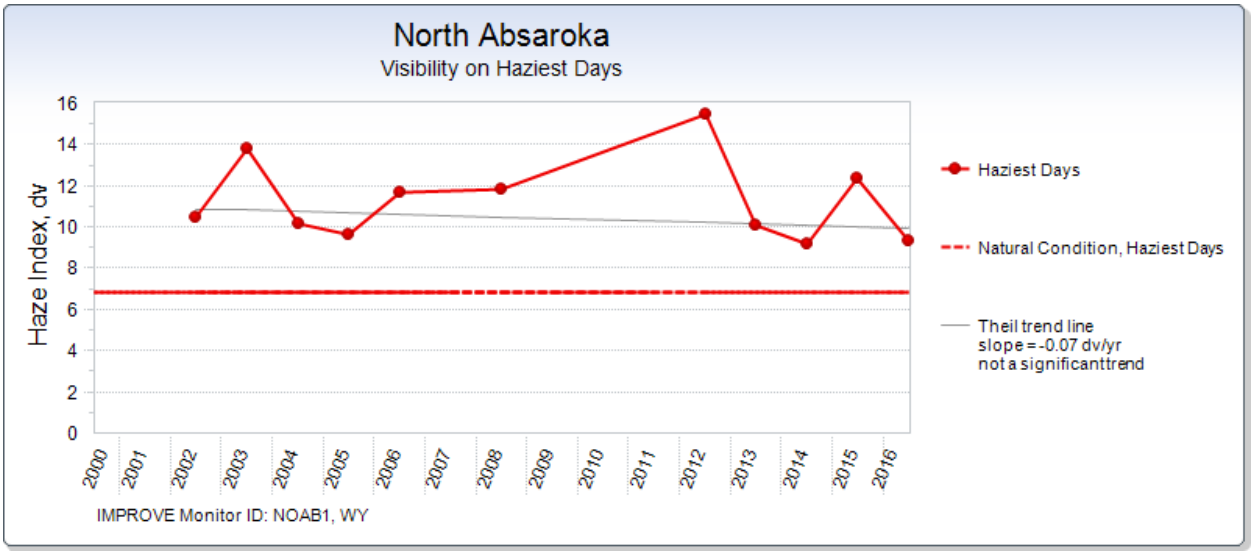


Figure 5. North Absaroka IMPROVE Station Visibility Trends on Haziest Days, 2000-2016

[1] Both figures sourced from the Federal Land Manager Environmental Database: http://views.cira.colostate.edu/fed/SiteBrowser/Default.aspx?appkey=SBCF_VisSum

IV. Idaho and Montana Emissions Inventory Analysis

Data for this analysis were sourced from the EPA's triennial 2014 National Emissions Inventory (NEI) data page (https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data). Only point sources were evaluated because this is the only category where accurate latitude/longitude information is provided by pollutant. The data were placed into 10 kilometer (km) by 10 km grids according to the source locations provided. The pollutants assessed were VOCs, NO_x, and SO_2. The resulting gridded emission inventory maps are displayed in Figures 6 through 8, below.

Because O_3 is a secondary pollutant formed through chemical interactions with precursor pollutants including NO_x and VOC emissions, the AQD examined gridded emission inventory data maps for these pollutant groups as approximate temporal indications of O_3 formation.

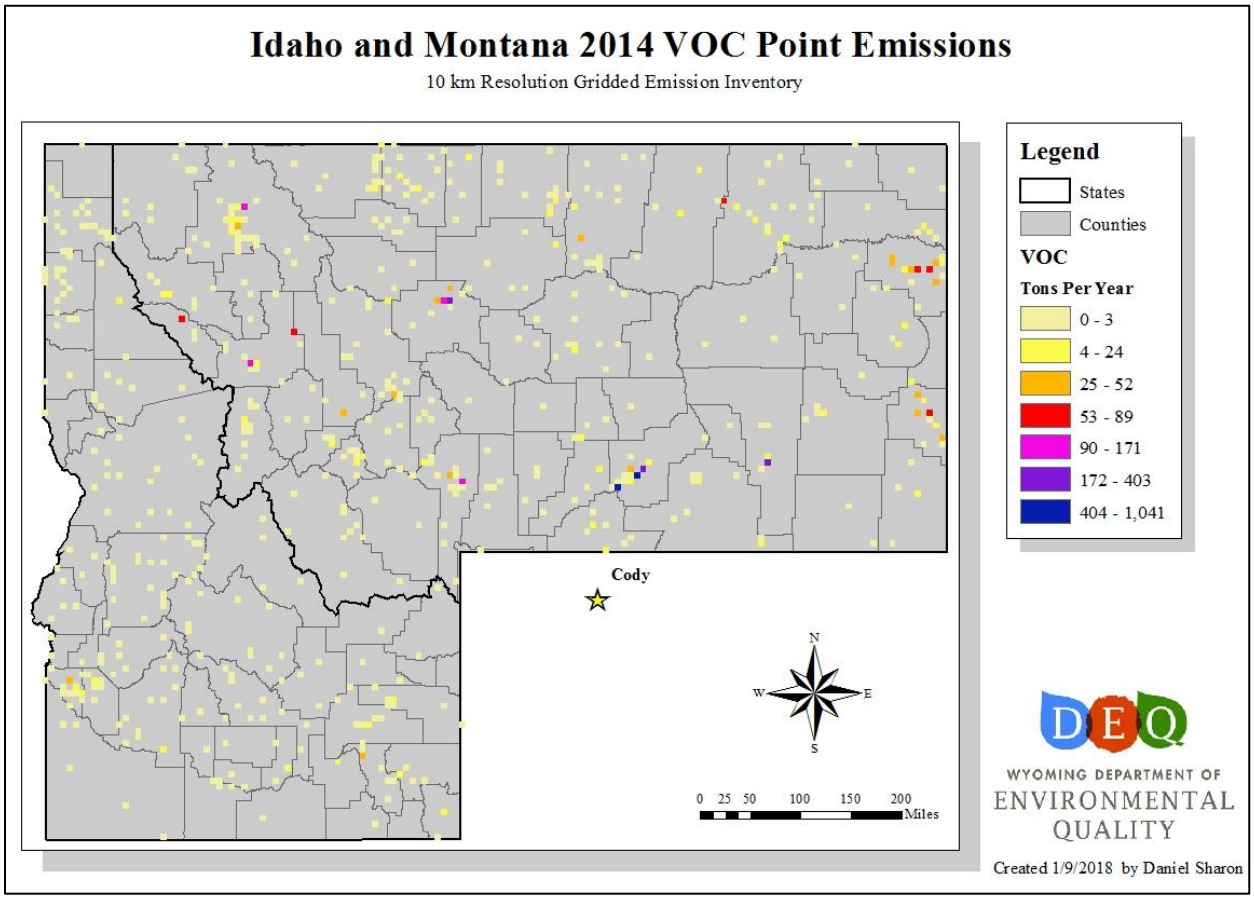


Figure 6. VOC Emissions from Point Sources

The top ten point sources with the highest VOC emissions in the counties directly upwind of Cody are listed in Table 2, below.

Facility	State	County	Latitude	Longitude	VOC Emissions (TPY)
CHS Laurel Refinery	MT	Yellowstone	45.659	-108.768	981.8
Exxon Mobil Billings Refinery	MT	Yellowstone	45.813	-108.433	384.5
Phillips 66 Billings Refinery	MT	Yellowstone	45.78	-108.489	336.9
Bozeman Petroleum Product Terminal	MT	Gallatin	45.698	-111.04	128
Fiberglass Structures, Inc. Tank	MT	Yellowstone	45.667	-108.755	38.8
Billings Bakery	MT	Yellowstone	45.749	-108.545	32.4
Big Sky Insulation, Inc.	MT	Gallatin	45.781	-111.192	29.4
Billings Logan International Airport	MT	Yellowstone	45.808	-108.56	27.6
Billings Landfill Gas Production Facility	MT	Yellowstone	45.714	-108.549	18.6
Fiberglass Structures, Inc.	MT	Yellowstone	45.667	-108.762	16.1

Table 2. Montana/Idaho VOC Point Sources Upwind of Cody

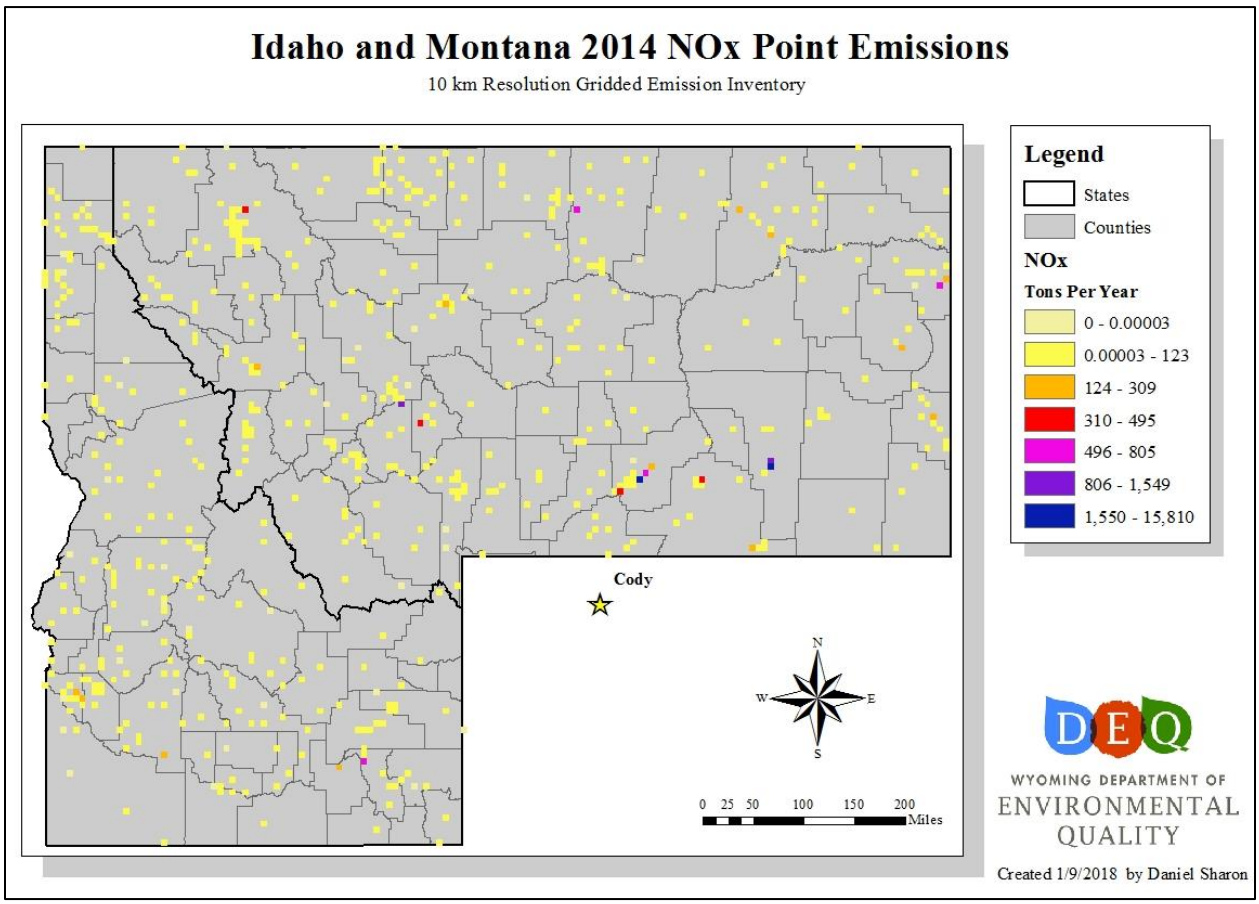


Figure 7. NO_x Emissions from Point Sources

The top ten point sources with the highest NO_x emissions in the counties directly upwind of Cody are listed in Table 3, below.

Facility	State	County	Latitude	Longitude	VOC Emissions (TPY)
J.E. Corette Power Plant	MT	Yellowstone	45.775	-108.481	786.4
Phillips 66 Billings Refinery	MT	Yellowstone	45.78	-108.489	560.7
Yellowstone Power Plant	MT	Yellowstone	45.811	-108.429	445.7
CHS Laurel Refinery	MT	Yellowstone	45.659	-108.768	401.2
RMP Hardin Generating Station	MT	Big Horn	45.764	-107.6	350.8
Exxon Mobil Billings Refinery	MT	Yellowstone	45.813	-108.433	304
Western Sugar Coop Billings Sugar Mill	MT	Yellowstone	45.768	-108.498	235.1
Spring Creek Mine	MT	Big Horn	45.112	-106.904	194.5
Huntley Rail Yard	MT	Yellowstone	45.9	-108.298	138.2
Billings Logan International Airport	MT	Yellowstone	45.808	-108.56	75.3

Table 3. Montana/Idaho NO_x Point Sources Upwind of Cody

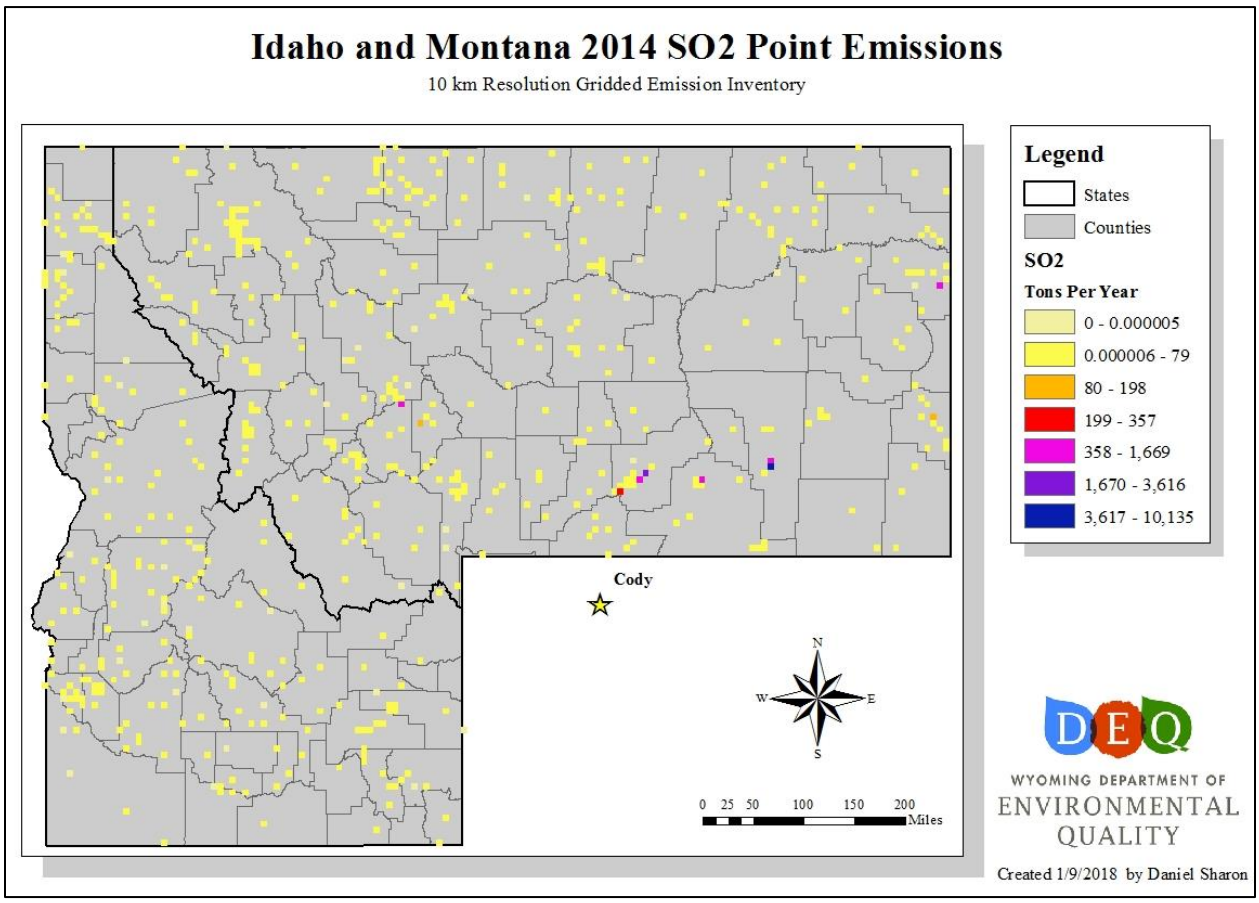


Figure 8. SO_2 Emissions from Point Sources

The top ten point sources with the highest SO_2 emissions in the counties directly upwind of Cody are listed in Table 4, below.

Facility	State	County	Latitude	Longitude	VOC Emissions (TPY)
Yellowstone Power Plant	MT	Yellowstone	45.811	-108.429	1,525.3
Montana Sulphur and Chemical Co. Plant	MT	Yellowstone	45.813	-108.428	1,436.4
J.E. Corette Power Plant	MT	Yellowstone	45.775	-108.481	1,433.1
Exxon Mobil Billings Refinery	MT	Yellowstone	45.813	-108.433	652.1
RMP Hardin Generating Station	MT	Big Horn	45.764	-107.6	381.8
CHS Laurel Refinery	MT	Yellowstone	45.659	-108.768	236
Western Sugar Coop Billings Sugar Mill	MT	Yellowstone	45.768	-108.498	122.8
Phillips 66 Billings Refinery	MT	Yellowstone	45.78	-108.489	87.8
Spring Creek Mine	MT	Big Horn	45.112	-106.904	22.8
Billings Wastewater Treatment Plant	MT	Yellowstone	45.803	-108.47	21.5

Table 4. Montana/Idaho SO_2 Point Sources Upwind of Cody

Based on these figures and tables, the top ten point sources for VOCs, NO_x, and SO_2 are all from upwind Counties in Montana.

V. HYSPLIT Trajectory Analyses

HYSPLIT (Hybrid Single Particle Lagrangian Integrated Trajectory) Model Analyses generate wind trajectories up to forty-eight (48) hours prior to (backwards trajectory) or after (forwards trajectory) a chosen start date of interest. A backwards trajectory is a valuable indicator of what could affect a stationary location such as a city or monitoring station. A forwards trajectory is beneficial to view possible dispersion from an emission source. Both types of trajectories were performed for this analysis, with two (2) starting heights: 250 and 500 meters.

For the purposes of this analysis, the top 18 emissions sources described in Section III above were grouped by relative location. These HYSPLIT source groups are shown in Figure 9, below.

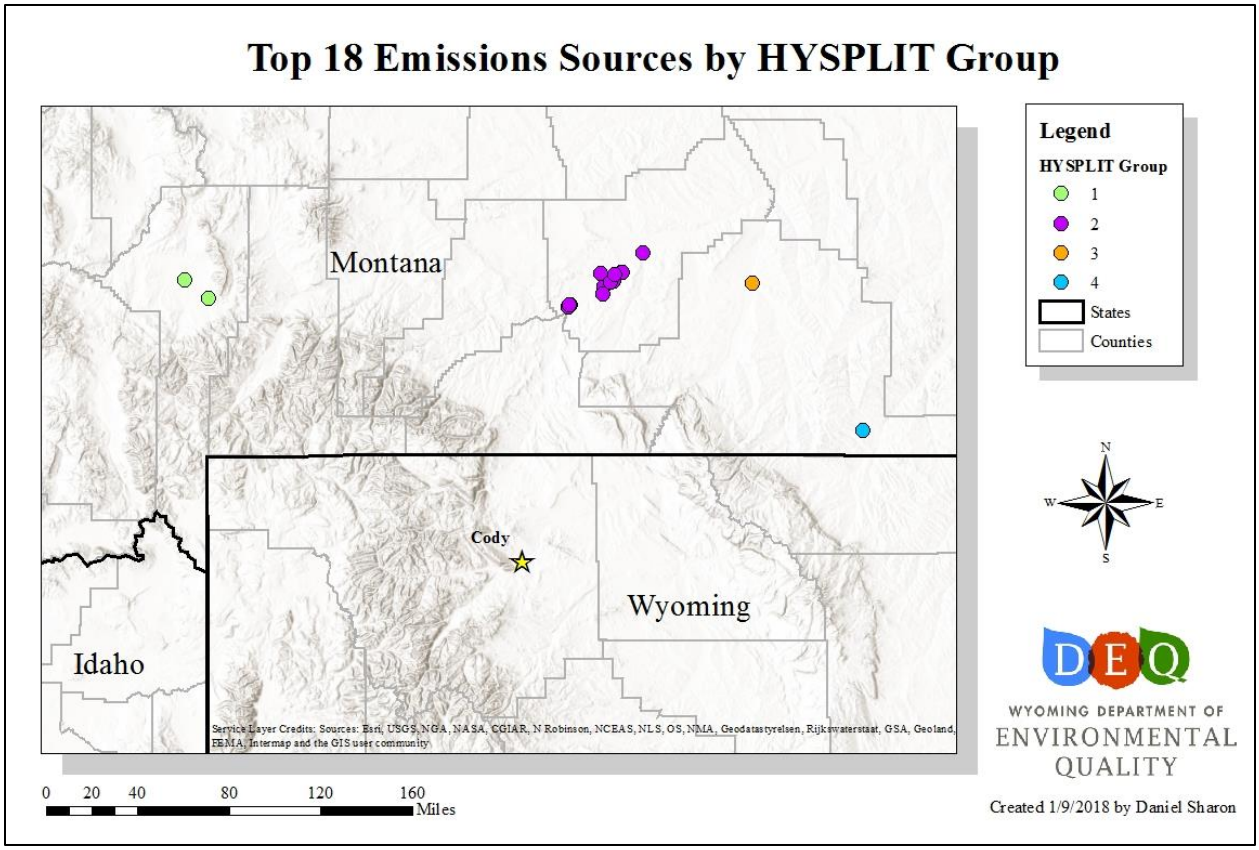


Figure 9. Emissions Point Sources Grouped by Location

Though none of top 18 emissions sources identified were in Idaho and emission impacts from that state on Cody are likely minimal, an additional HYSPLIT forwards trajectory was run from the general direction of these upwind counties. The locations, starting dates, and trajectory information are found below in Table 5. Starting dates for HYSPLIT runs were chosen based on meteorological conditions conducive to pollutant transport. The locations of each HYSPLIT run is shown in Figure 10, below.

Site Location	County	Latitude	Longitude	Start Date	HYSPLIT Run	Trajectory Type
Bozeman, MT	Gallatin	45.676	-111.042	5/10/2015	1	Forwards
Billings, MT	Yellowstone	45.783	-108.494	11/4/2015	2	Forwards
Hardin, MT	Big Horn	45.764	-107.6	9/22/2017	3	Forwards
Decker, MT	Big Horn	45.086	-106.861	11/6/2017	4	Forwards
Ashton, ID	Fremont	44.07	-111.448	7/22/2016	5	Forwards
Cody, WY	Park	44.526	-109.057	5/17/2015	6	Backwards

Table 5. HYSPLIT Run Information

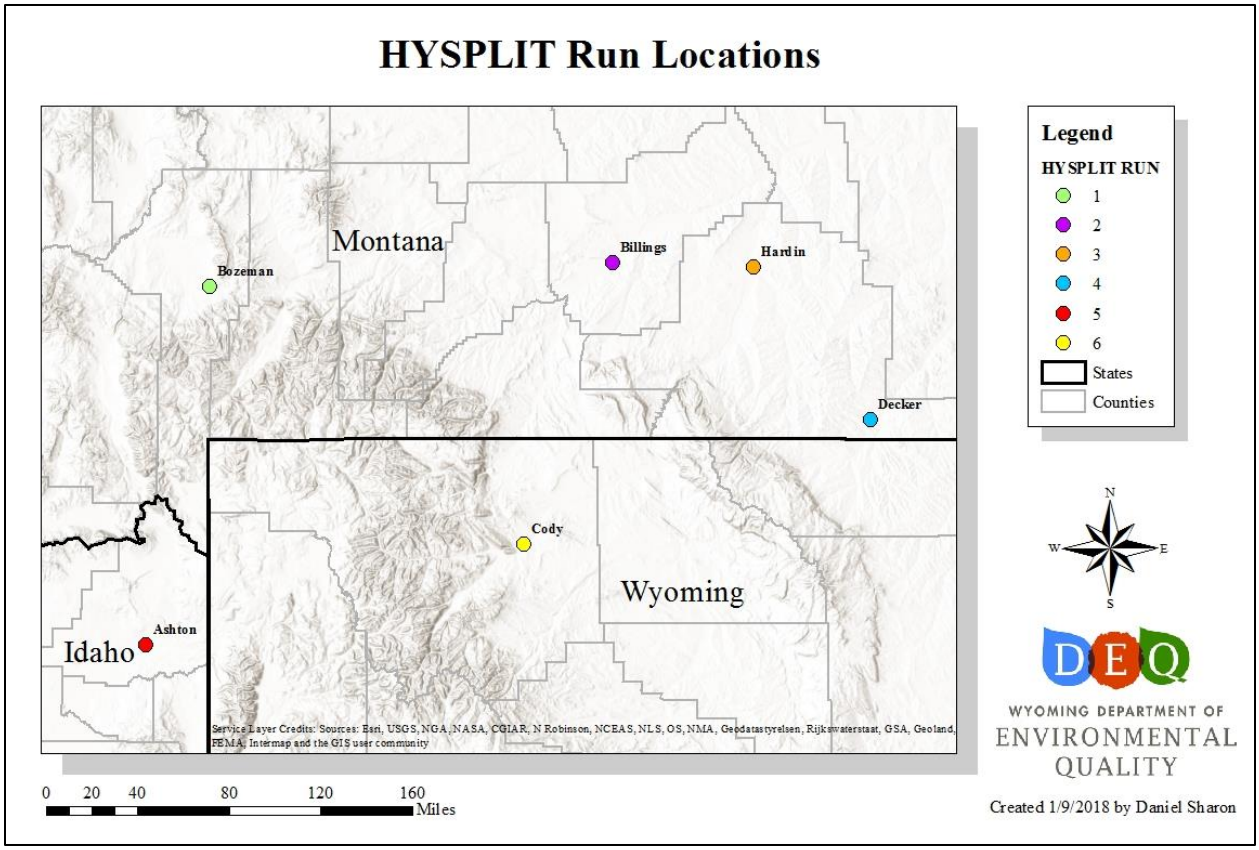


Figure 10. HYSPLIT Run Locations

Trajectory data were obtained from NOAA's Air Resource Laboratory HYSPLIT Model, available here: https://ready.arl.noaa.gov/HYSPLIT.php[2]. The trajectory results of these model runs are shown in Figures 11 through 16, below.

[2] Stein, A.F., Draxler, R.R, Rolph, G.D., Stunder, B.J.B., Cohen, M.D., and Ngan, F., (2015). NOAA's HYSPLIT atmospheric transport and dispersion modeling system, Bull. Amer. Meteor. Soc., 96, 2059-2077, http://dx.doi.org/10.1175/BAMS-D-14-00110.1

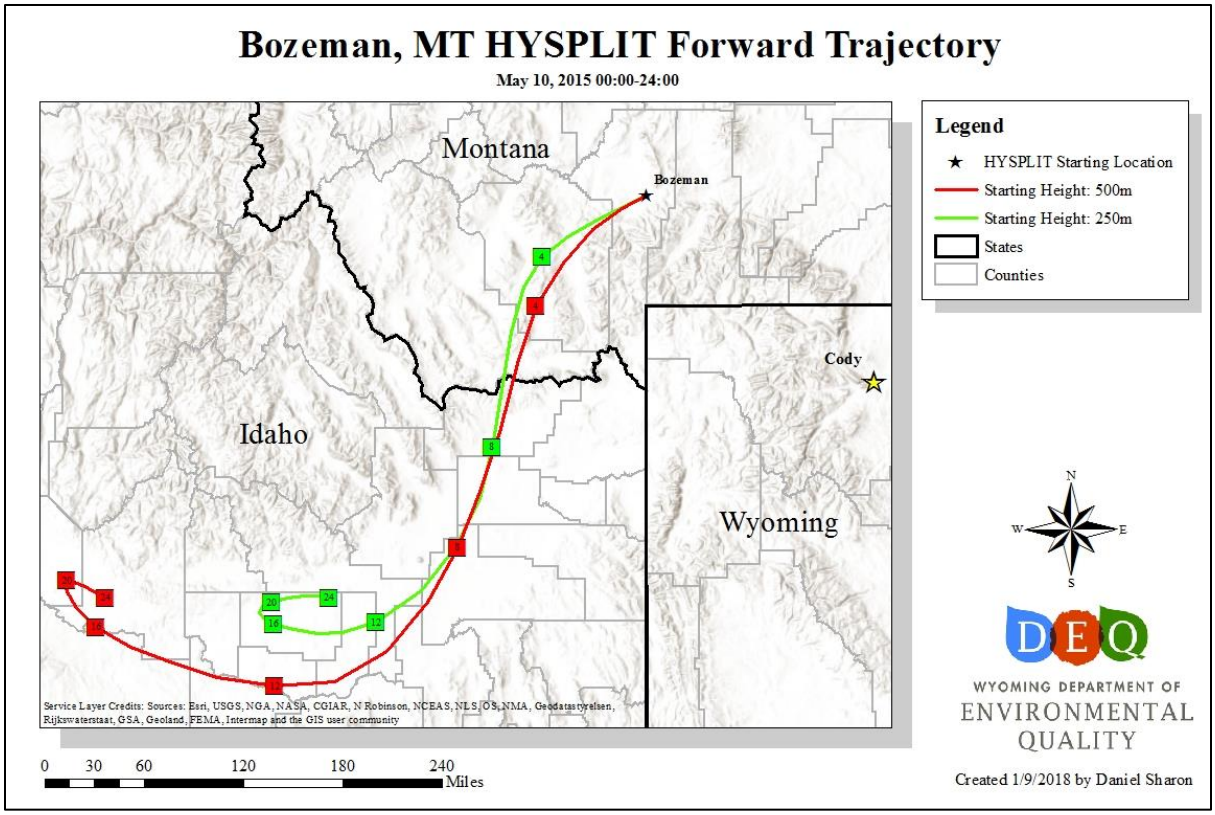


Figure 11. HYSPLIT Run 1 (Bozeman, MT)

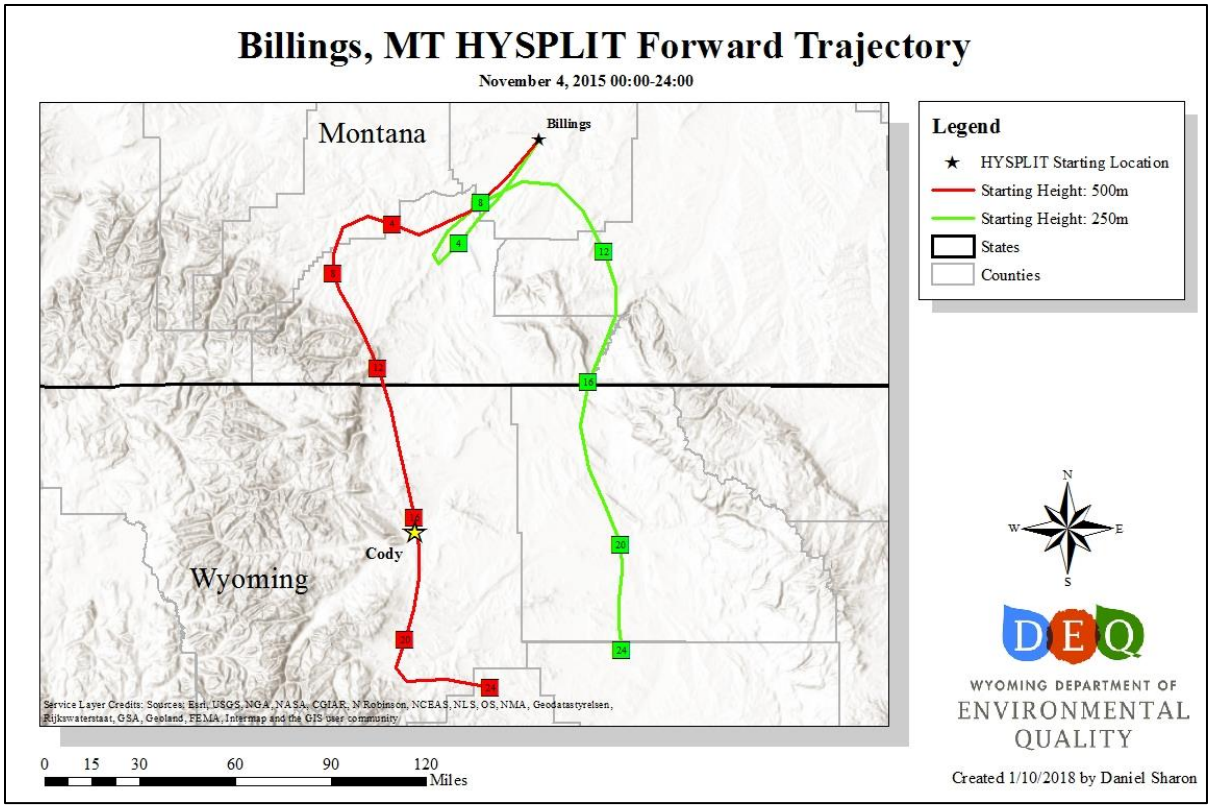


Figure 12. HYSPLIT Run 2 (Billings, MT)

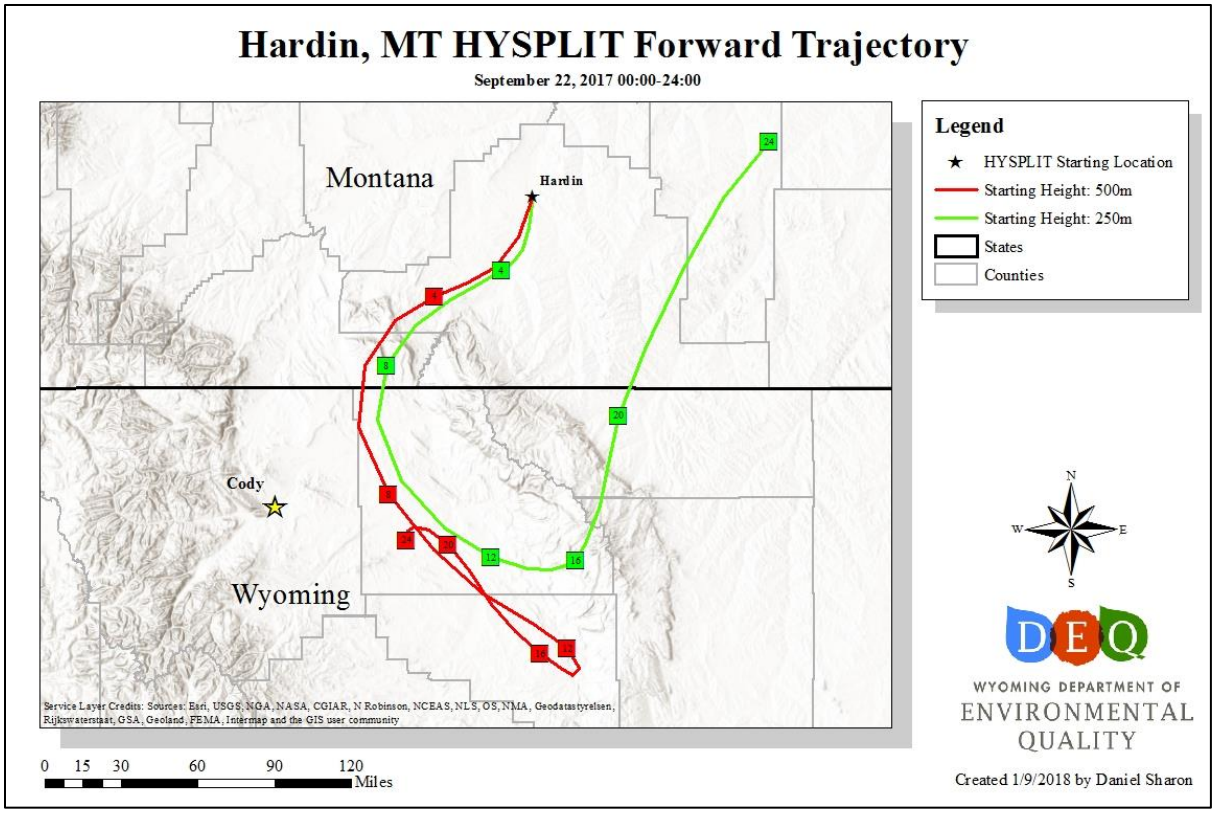


Figure 13. HYSPLIT Run 3 (Hardin, MT)

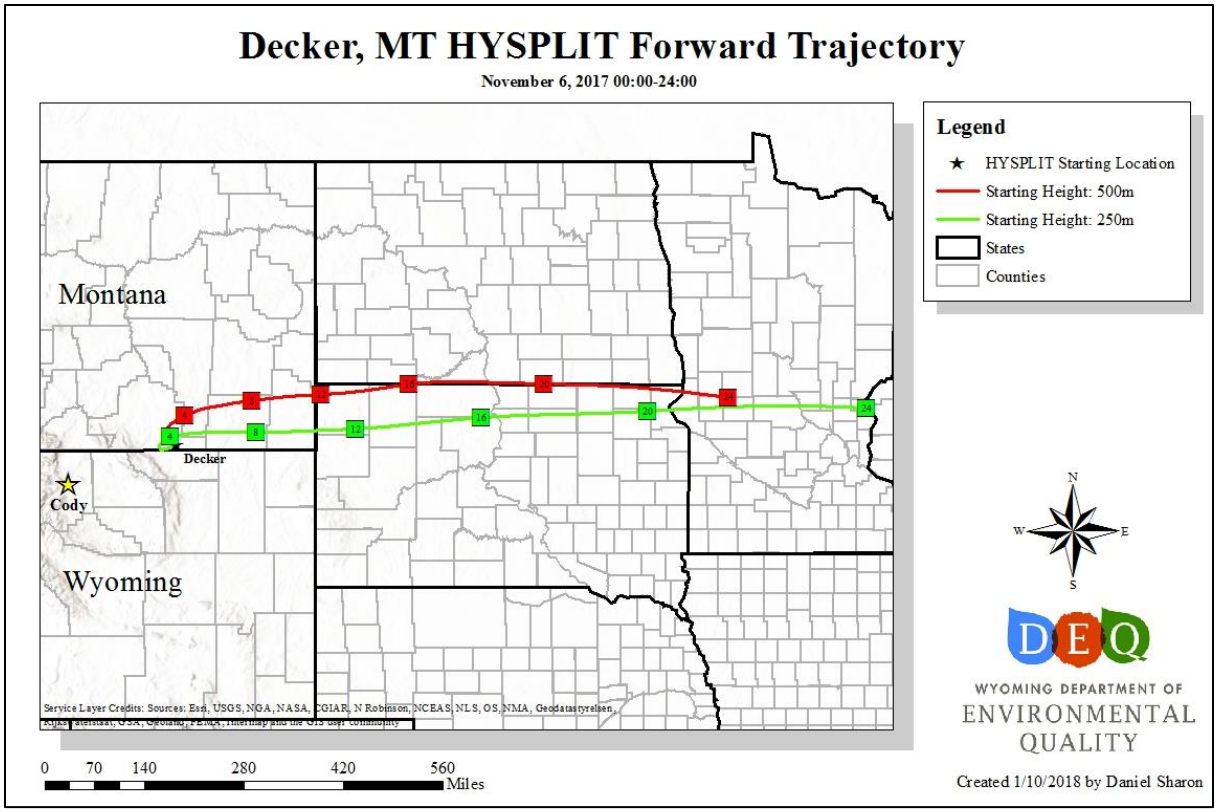


Figure 14. HYSPLIT Run 4 (Decker, MT)

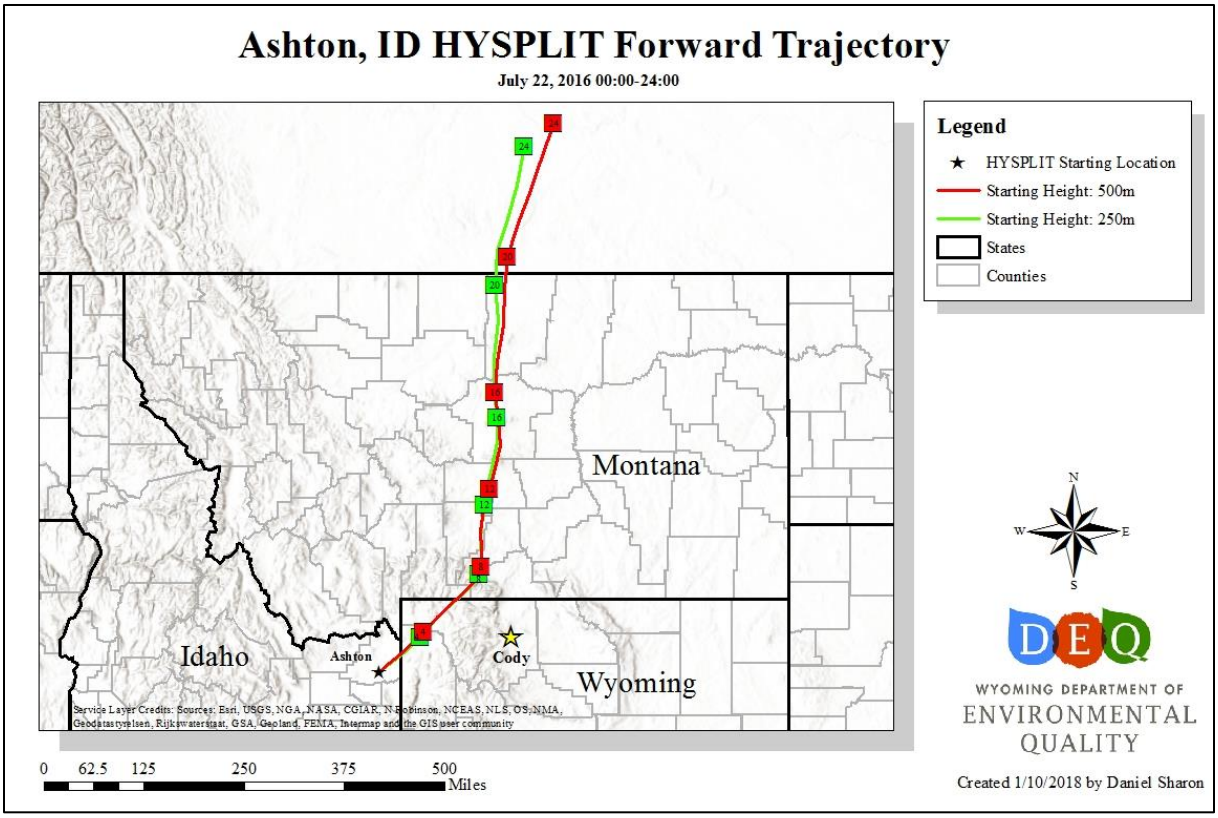


Figure 15. HYSPLIT Run 5 (Ashton, ID)

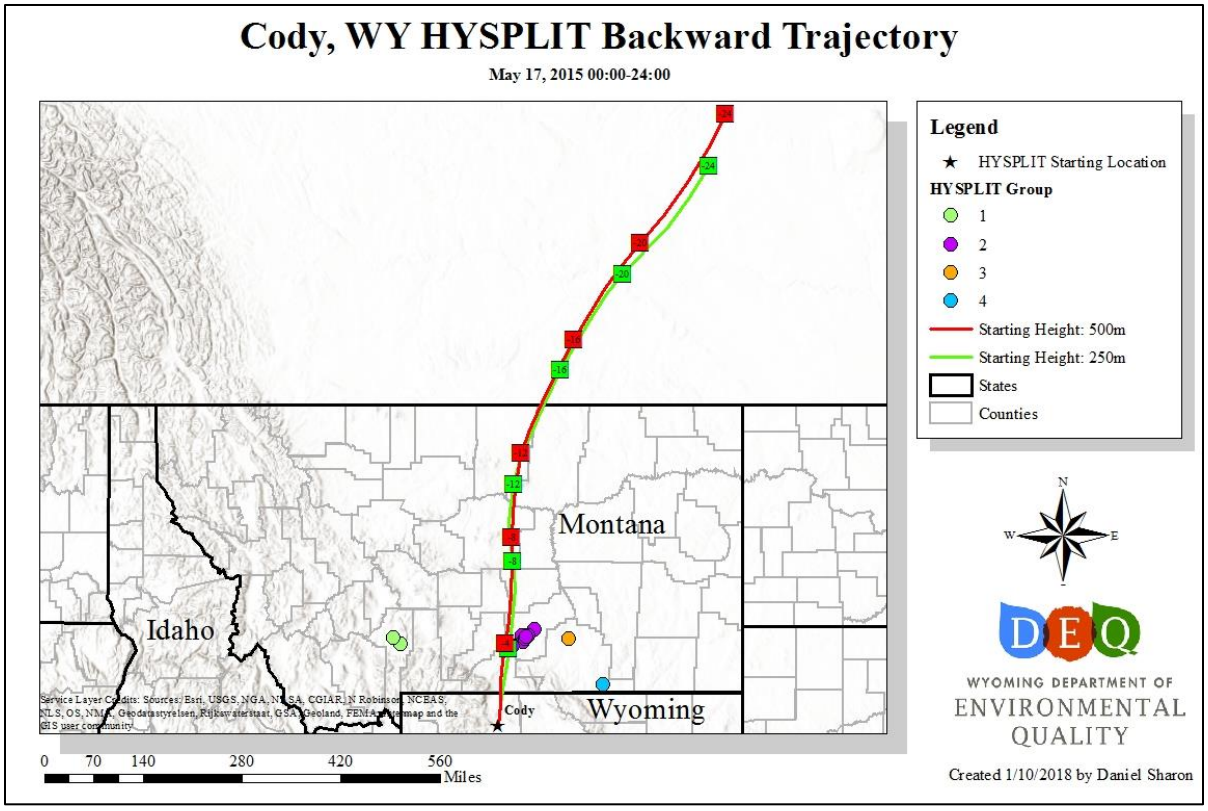


Figure 16. HYSPLIT Run 6 (Cody, WY)

Based on these modeled trajectories, emissions from Montana's Carbon, Yellowstone, and Stillwater Counties can reasonably be expected to impact air quality in Cody under prevailing meteorological conditions. According to these Figures it appears that the Big Horn and Absaroka mountain ranges, running north-south to the east and west of Cody, respectively, play a large role in the movement of air masses in the area.

VI. Summary and Conclusion

Winds in Cody are predominantly out of the WSW and NNE. Some of the largest emissions sources in Montana for VOCs, NO_x, and SO_2 are located directly upwind of Cody, Wyoming in Yellowstone County. Modeling analyses from these emissions sources demonstrate that under typical meteorological conditions air masses are reasonably expected to travel to, and influence air quality in Cody, Wyoming. No previous NAAQS-comparable gaseous monitoring has occurred in Park County.

This conclusion validates and enhances the finding in the AQD's Network Assessment that future gaseous monitoring is needed to characterize air quality in the city of Cody, WY. The AQD plans to site a mobile monitoring station in or around the city of Cody in spring 2018.

Appendix F: Jackson Analyses

Wyoming Department of Environmental Quality
Air Quality Division
Memorandum

To: Nancy E. Vehr, Air Quality Administrator 10-2-17

Through: Darla Potter, Air Quality Resource Management Program Manager 10/2/17
Cara Keslar, Monitoring Section Supervisor 10/2/17

From: Daniel Sharon, Monitoring Project Manager 9/29/17

Cc: Jeff Wendt, District 5 Engineer

Date: September 29, 2017

Subject: Wyoming Department of Environmental Quality, Air Quality Division
Jackson Analysis to Support 2015 Network Assessment

I. Background

The Air Quality Division's (AQD) 2015 Network Assessment included a finding that further analyses were required to evaluate the need for gaseous monitoring in all previously un-monitored micropolitan statistical areas in the state, including the city of Jackson. The language from the Network Assessment is as follows:

"***Section 4.2.6 Gaseous Monitoring for All Micropolitan Statistical Areas***

The AQD would like to conduct further analyses to determine the need for monitoring for gaseous pollutants in all micropolitan statistical areas in the state, in addition to those areas previously identified. These analyses would include emissions inventories for adjacent states, additional HYSPLIT trajectory analyses, and a review of all existing and previous monitoring data.

Other micropolitan areas or cities with at least 9,500 people to study would include Jackson (Teton County), Cody (Park County), and Evanston (Uinta County)."

The following analysis fulfills this data need for the city of Jackson by reviewing all existing gaseous monitoring data in the area, analyzing Idaho and Montana's Emissions Inventories to identify large sources of gaseous pollutants proximate to or upwind of the city, and presenting HYSPLIT forward-trajectory modeling runs from these sources to determine if pollutants from these sources are expected to impact the area.

II. Meteorological Information

Wind Speed and Wind Direction information were collected from the Grand Teton National Park Science School monitoring station and the Jackson Hole Airport (JAC) meteorological station. The locations of these two monitors are displayed in Figure 1, below.

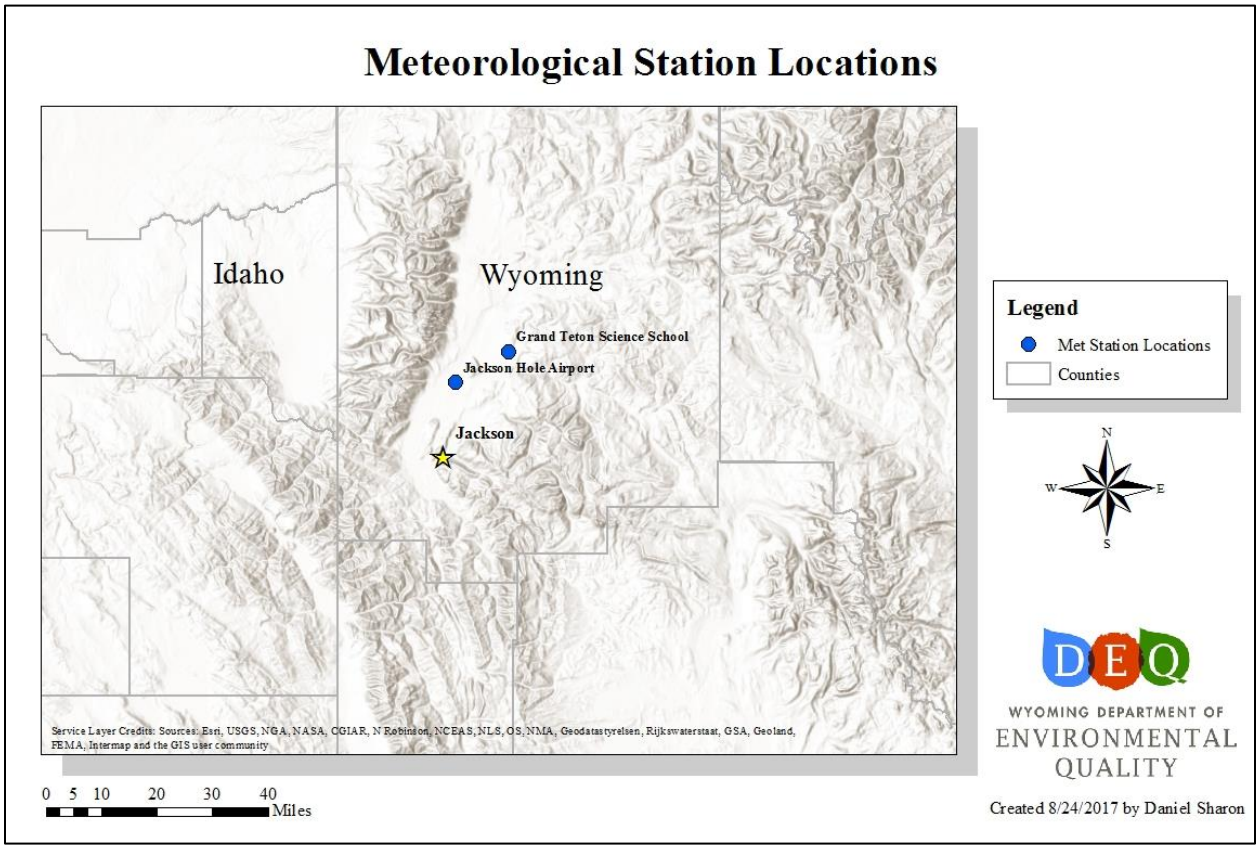


Figure 1. Grand Teton Science School and Jackson Hole Airport Meteorological Station Locations

Wind roses were generated for both stations for the monitoring period of 2014-2016 (the most recent three-year period of available data for both sites). It should be noted that these stations are sited in such a way that they would not be expected to accurately represent the wind patterns of the City of Jackson, but are the closest data available to the city. Complex mountainous terrain in the area is expected to lead to highly localized wind patterns. Therefore, the wind roses displayed below are for illustrative purposes only. These wind roses are displayed in Figures 2 and 3, below.

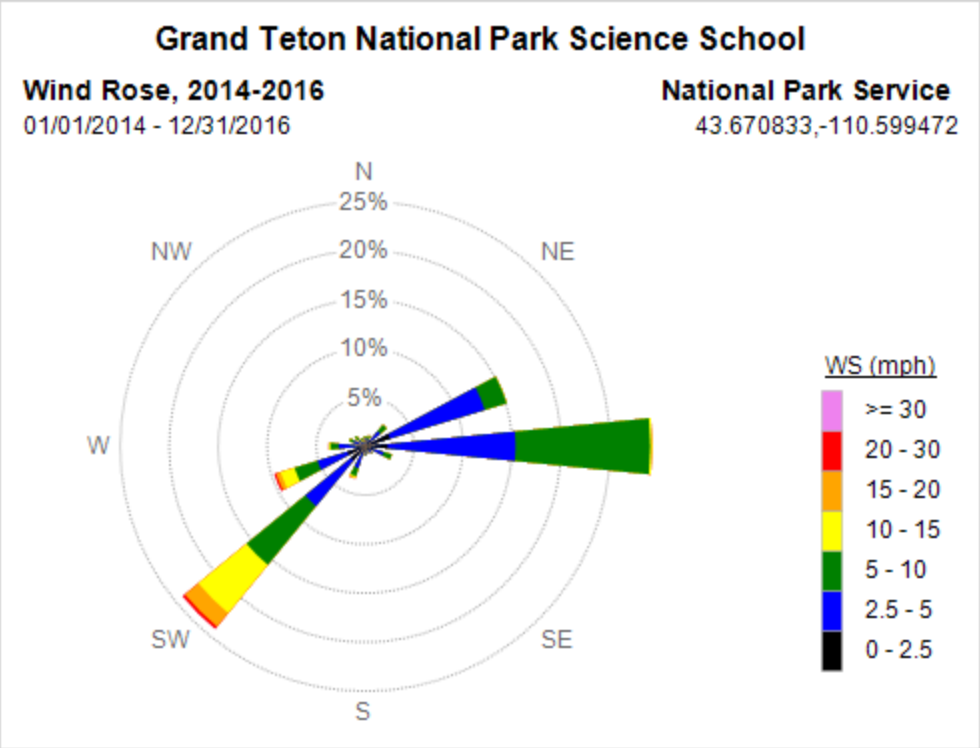


Figure 2. Grand Teton National Park Science School 2014-2016 Wind Rose

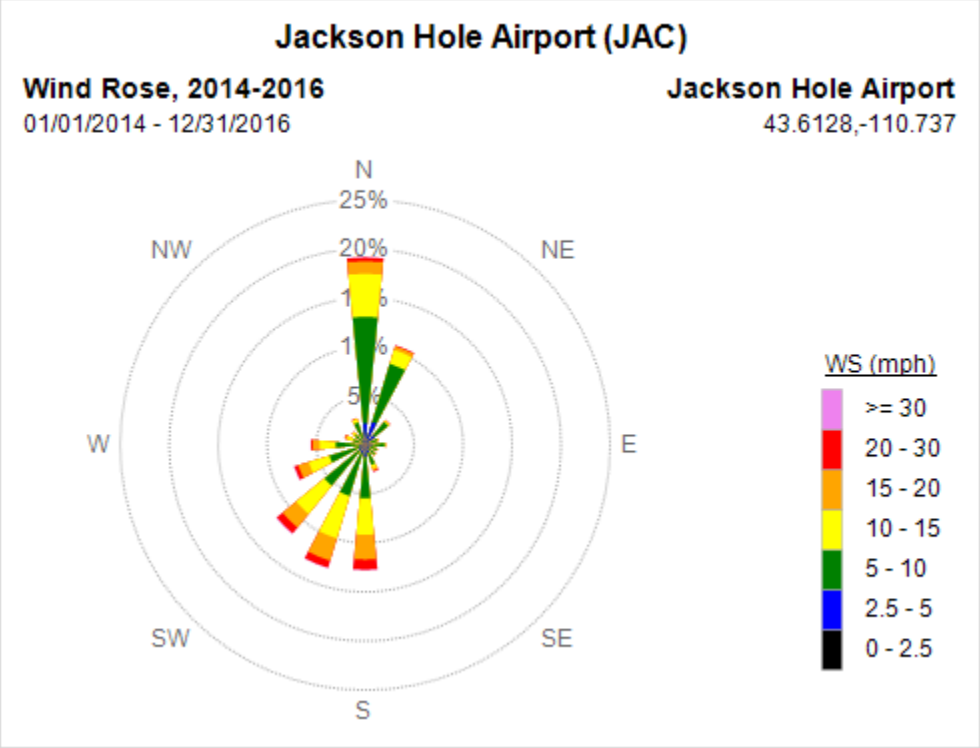


Figure 3. Jackson Hole Airport 2014-2016 Wind Rose

Based on these figures, winds in the Jackson area generally have a NE/SW bimodal character, changing to a more dominant NNE/SSW character closer to the city itself. Based on the Jackson Hole Airport data, the strongest winds in the Jackson area are expected out of the SW and SSW, while winds are most likely to occur out of the N and NE. This indicates that the State of Idaho is most likely to have an impact on Jackson air quality, outside of influences from the State of Wyoming itself from the north and south. Idaho counties most likely to have an impact on Jackson air quality are Bannock, Bonneville, Caribou, and Bingham, which are directly upwind of the city.

III. Existing Gaseous Monitoring Data

The only existing gaseous monitoring data within a 20 mile radius of the city is an ozone analyzer operated by the National Park Service at the Grand Teton Science School. The location of this station is shown in Figure 1, above, and site details are summarized in Table 1, below:

Site Name	Grand Teton NP – Science School
Operating Agency	National Park Service
Monitor Type	Non-EPA Federal
Site ID	56-039-0008
Latitude/Longitude	43.670833,-110.599472

Table 1. Grand Teton National Park Science School Monitor Information

This station began collecting ozone data in August 2011. During its six (6) years of operation the station has not recorded a single exceedance of the applicable 8-hour ozone NAAQS. The highest daily maximum 8-hour average recorded by the site was 72 ppb measured on August 12, 2012, below the then-applicable NAAQS of 75 ppb. The three-year design values for the monitoring station are summarized in Table 2, below:

	2011	2012	2013	2014	2015	2016	3-Year Design Value (70 ppb Ozone Standard)[3]
2011 DV	56						**56[4]**
2012 DV	56	67					**61[4]**
2013 DV	56	67	60				**61[4]**
2014 DV		67	60	60			**62**
2015 DV			60	60	59		**59**
2016 DV				60	59	60	**59**

Table 2. Grand Teton National Park Science School Monitor Ozone Design Values

IV. Idaho Emissions Inventory Analysis

Data for this analysis were sourced from the Environmental Protection Agency's (EPA) triennial 2014 National Emissions Inventory (NEI) data page (https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data). Only point sources were evaluated because this is the only category where accurate latitude/longitude information is provided by pollutant. The data were placed into 10 kilometer (km) by 10 km grids according to the source locations provided. The pollutants assessed were VOCs, NO_x, and SO_2. The resulting gridded emission inventory maps are displayed in Figures 4 through 6, below.

Because O_3 is a secondary pollutant formed through chemical interactions with precursor pollutants including NO_x and VOC emissions, the AQD examined gridded emission inventory data maps for these pollutant groups as approximate temporal indications of O_3 formation.

[3] EPA 2015 Ozone Standard: 70 ppb – 4th highest daily maximum 8-hour ozone concentration per year, averaged over 3 years.

[4] Data in 2011 does not meet completeness criteria as the station began operating in August 2011. Therefore, the first valid 3-year Design Value is for 2014.

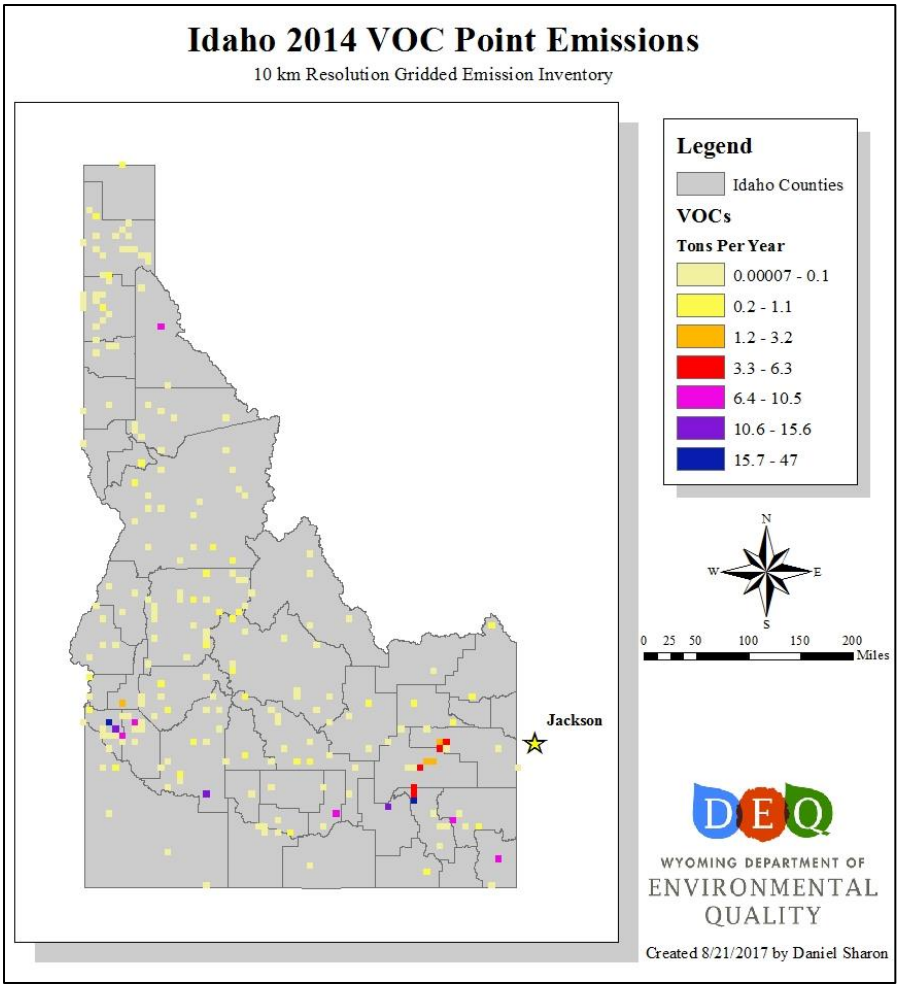


Figure 4. VOC Emissions from Point Sources

The top ten point sources with the highest VOC emissions in the counties directly upwind of Jackson are listed in Table 3, below.

Facility	County	Latitude	Longitude	VOC Emissions (TPY)
Pocatello Railyard	Bannock	42.859	-112.444	35.6
Bancroft Railyard	Caribou	42.719	-111.879	8.0
Idaho Falls Railyard	Bonneville	43.489	-112.041	5.2
Blackfoot Railyard	Bingham	43.189	-112.343	4.8
Fort Hall Railyard	Bingham	43.033	-112.435	3.8
Shelly Railyard	Bingham	43.38	-112.124	3.3
Tyhee Railyard	Bannock	42.958	-112.459	3.1
Firth Railyard	Bingham	43.304	-112.184	2.4
Busch Agricultural Resources Inc. Malt Plant	Bonneville	43.445	-112.068	2.3
Wapello Railyard	Bingham	43.248	-112.26	1.9

Table 3. Idaho VOC Point Sources Upwind of Jackson

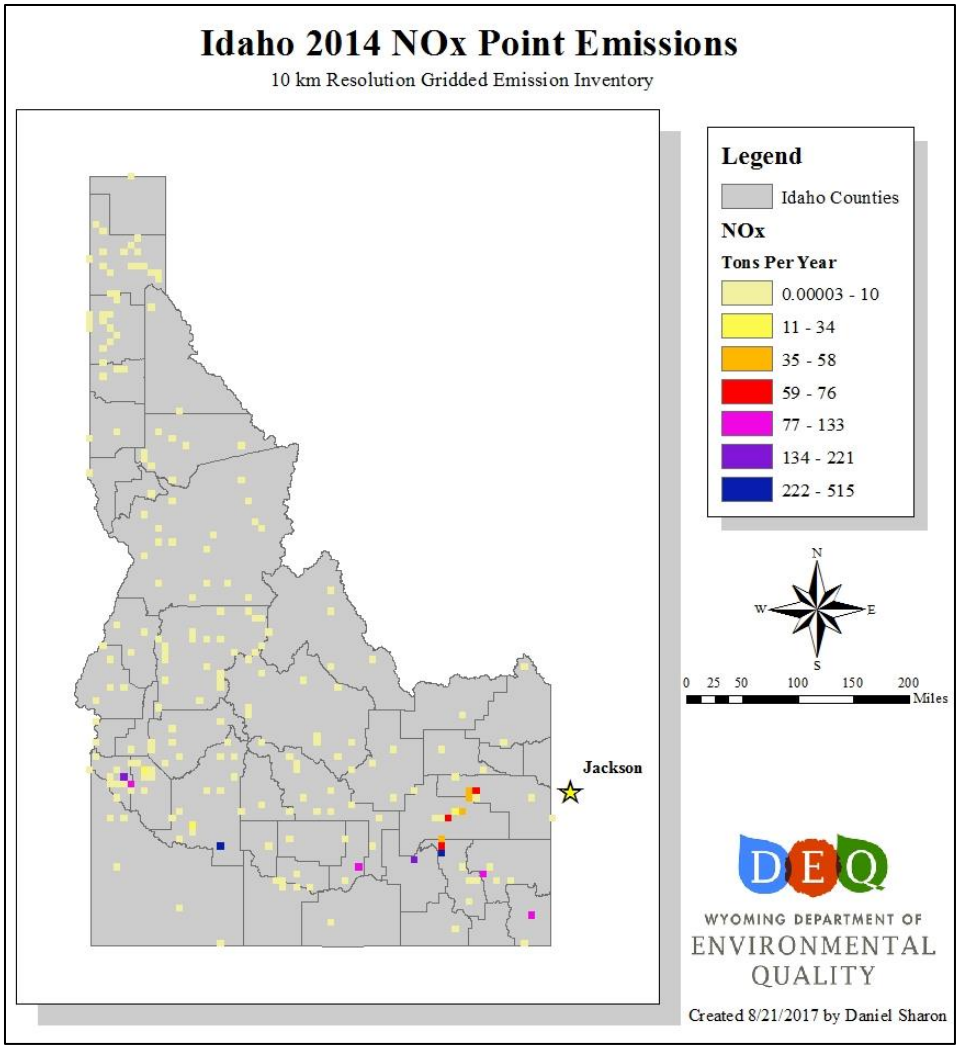


Figure 5. NO_x Emissions from Point Sources

The top ten point sources with the highest NO_x emissions in the counties directly upwind of Jackson are listed in Table 4, below.

Facility	County	Latitude	Longitude	NOx Emissions (TPY)
Pocatello Railyard	Bannock	42.859	-112.444	514.3
Bancroft Railyard	Caribou	42.719	-111.879	115.5
Idaho Falls Railyard	Bonneville	43.489	-112.041	76.4
Blackfoot Railyard	Bingham	43.189	-112.343	70.1
Fort Hall Railyard	Bingham	43.033	-112.435	55.4
Shelly Railyard	Bingham	43.38	-112.124	48.3
Tyhee Railyard	Bannock	42.958	-112.459	45.9
Busch Agricultural Resources Inc. Malt Plant	Bonneville	43.445	-112.068	42.2
Firth Railyard	Bingham	43.304	-112.184	35.9
Wapello Railyard	Bingham	43.248	-112.26	27.4

Table 4. Idaho NO_x Point Sources Upwind of Jackson

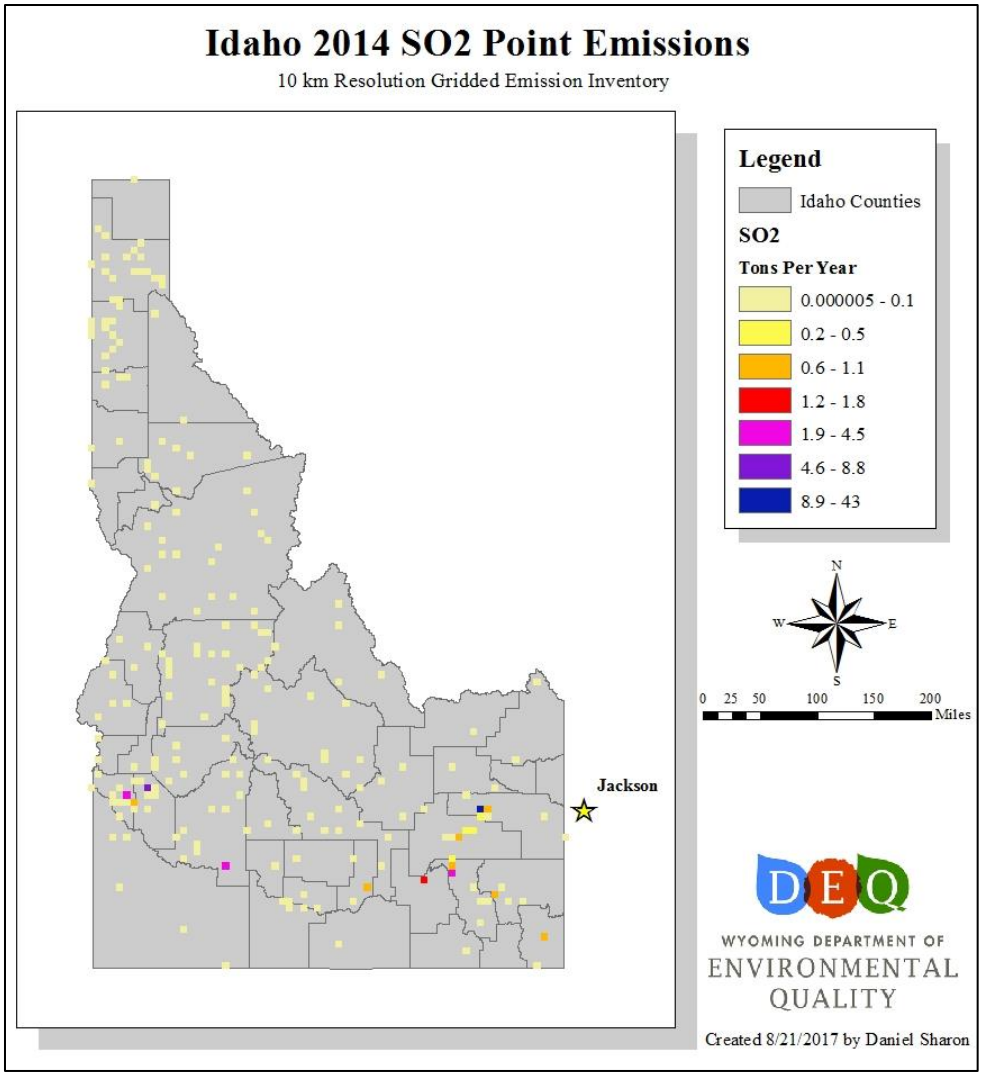


Figure 6. SO_2 Emissions from Point Sources

The top ten point sources with the highest SO_2 emissions in the counties directly upwind of Jackson are listed in Table 5, below.

Facility	County	Latitude	Longitude	SO_2 Emissions (TPY)
Busch Agricultural Resources Inc. Malt Plant	Bonneville	43.445	-112.068	42.5
Pocatello Railyard	Bannock	42.859	-112.444	4.4
Bancroft Railyard	Caribou	42.719	-111.879	1.0
Idaho Falls Railyard	Bonneville	43.489	-112.041	0.6
Blackfoot Railyard	Bingham	43.189	-112.343	0.6
Fort Hall Railyard	Bingham	43.033	-112.435	0.4
Shelly Railyard	Bingham	43.38	-112.124	0.4
Tyhee Railyard	Bannock	42.958	-112.459	0.4
Firth Railyard	Bingham	43.304	-112.184	0.3
Wapello Railyard	Bingham	43.248	-112.26	0.2

Table 5. Idaho SO_2 Point Sources Upwind of Jackson

V. HYSPLIT Trajectory Analyses

HYSPLIT (Hybrid Single Particle Lagrangian Integrated Trajectory) Model Analyses generate wind trajectories up to forty-eight (48) hours prior to (backwards trajectory) or after (forwards trajectory) a chosen start date of interest. A backwards trajectory is a valuable indicator of what could affect a stationary location such as a city or monitoring station. A forwards trajectory is beneficial to view possible dispersion from an emission source. Both types of trajectories were performed for this analysis, with two (2) starting heights: 250 and 500 meters.

For the purposes of this analysis, a backwards trajectory was run from the City of Jackson and forwards trajectories were run from each of the top 10 emissions sources described in Section IV above. These HYSPLIT source locations are shown in Figure 7, below.

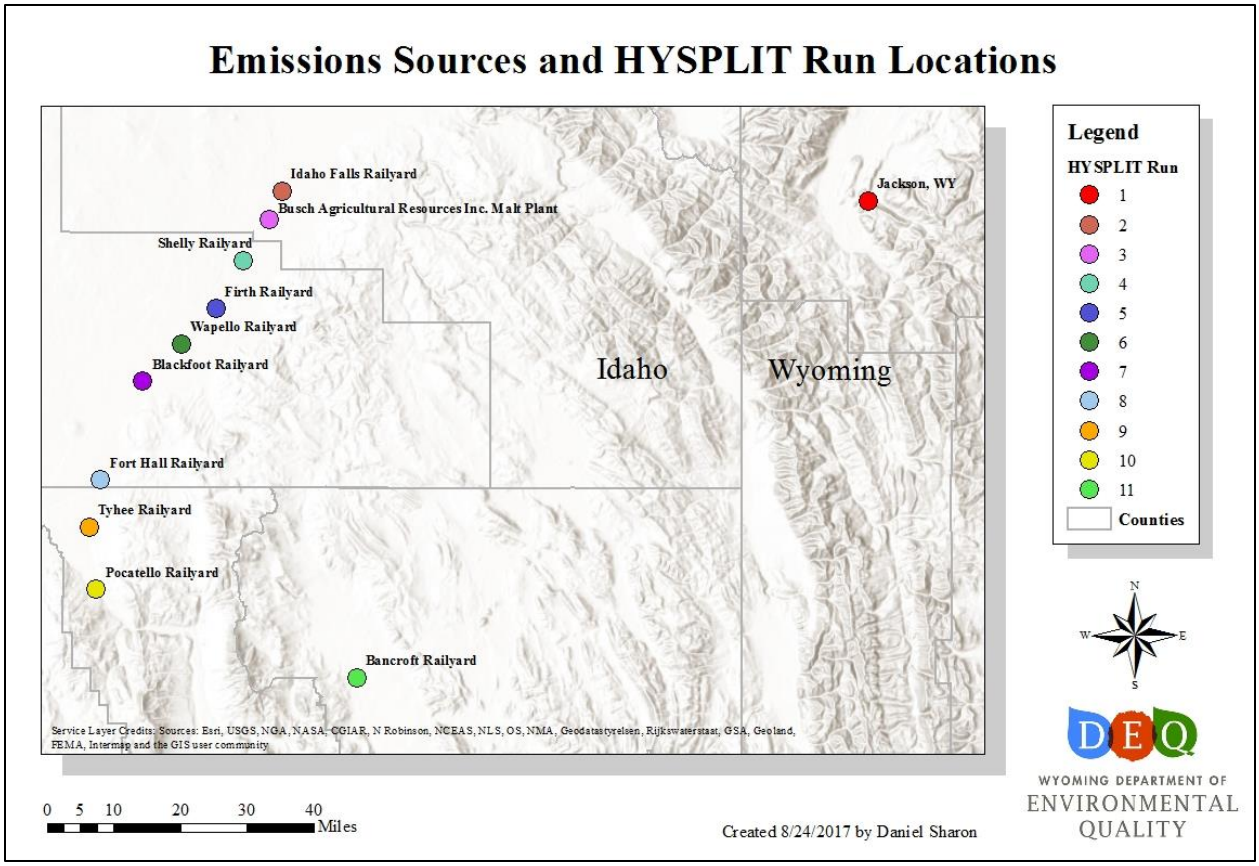


Figure 7. Emissions Point Sources and HYSPLIT Run Locations

The locations, starting dates, and trajectory information is found below in Table 6. Starting dates for HYSPLIT runs were chosen based on meteorological conditions conducive to pollutant transport based on consultation with AQD meteorologists.

Site Location	County	Latitude	Longitude	Start Date	HYSPLIT Run	Trajectory Type
Jackson, WY	Teton	43.474	-110.768	11/7/2016	1	Backwards
Idaho Falls Railyard	Bonneville	43.489	-112.041	11/23/2014	2	Forwards
Busch Agricultural Resources Inc. Malt Plant	Bonneville	43.445	-112.068	10/12/2014	3	Forwards
Shelly Railyard	Bingham	43.38	-112.124	11/24/2014	4	Forwards
Firth Railyard	Bingham	43.304	-112.184	7/4/2016	5	Forwards
Wapello Railyard	Bingham	43.248	-112.26	7/16/2016	6	Forwards
Blackfoot Railyard	Bingham	43.189	-112.343	12/28/2016	7	Forwards
Fort Hall Railyard	Bingham	43.033	-112.435	12/20/2016	8	Forwards
Tyhee Railyard	Bannock	42.958	-112.459	11/26/2014	9	Forwards
Pocatello Railyard	Bannock	42.859	-112.444	11/27/2014	10	Forwards
Bancroft Railyard	Caribou	42.719	-111.879	12/26/2016	11	Forwards

Table 6. HYSPLIT Run Information

Trajectory data were obtained from NOAA's Air Resource Laboratory HYSPLIT Model, available here: http://www.arl.noaa.gov/HYSPLIT_info.php[5]. The trajectory results of these model runs are shown in Figures 8 through 18, below.

[5] Stein, A.F., Draxler, R.R, Rolph, G.D., Stunder, B.J.B., Cohen, M.D., and Ngan, F., (2015). NOAA's HYSPLIT atmospheric transport and dispersion modeling system, Bull. Amer. Meteor. Soc., 96, 2059-2077, http://dx.doi.org/10.1175/BAMS-D-14-00110.1

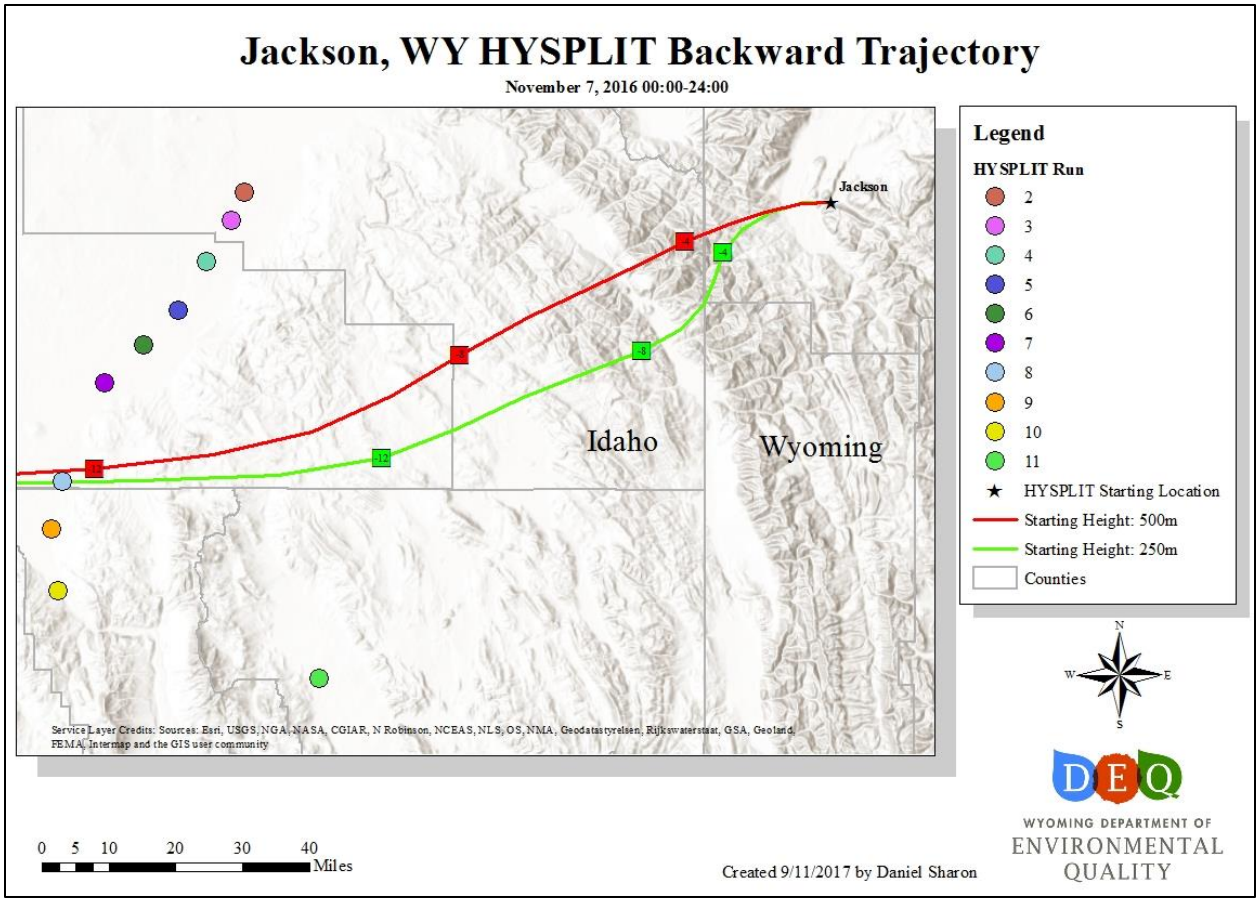


Figure 8. HYSPLIT Run 1 (Jackson)

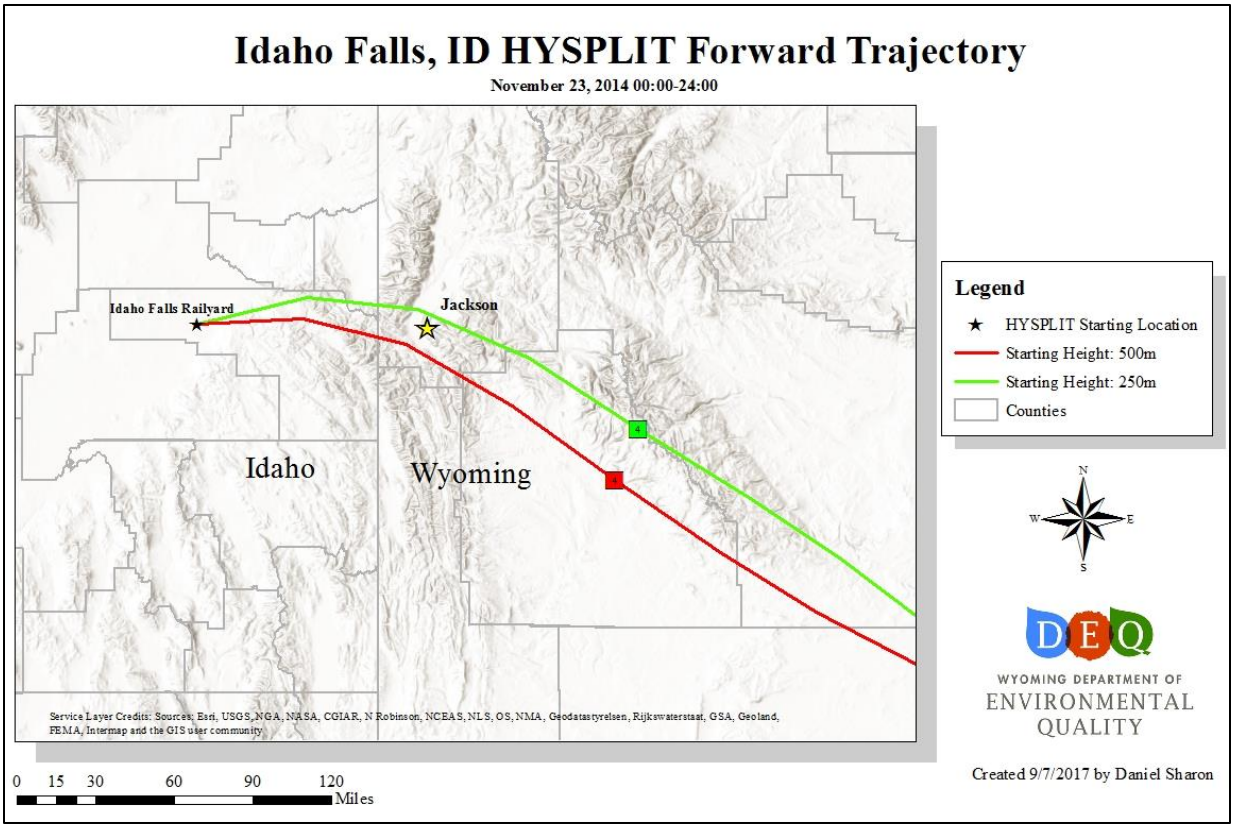


Figure 9. HYSPLIT Run 2 (Idaho Falls Railyard)

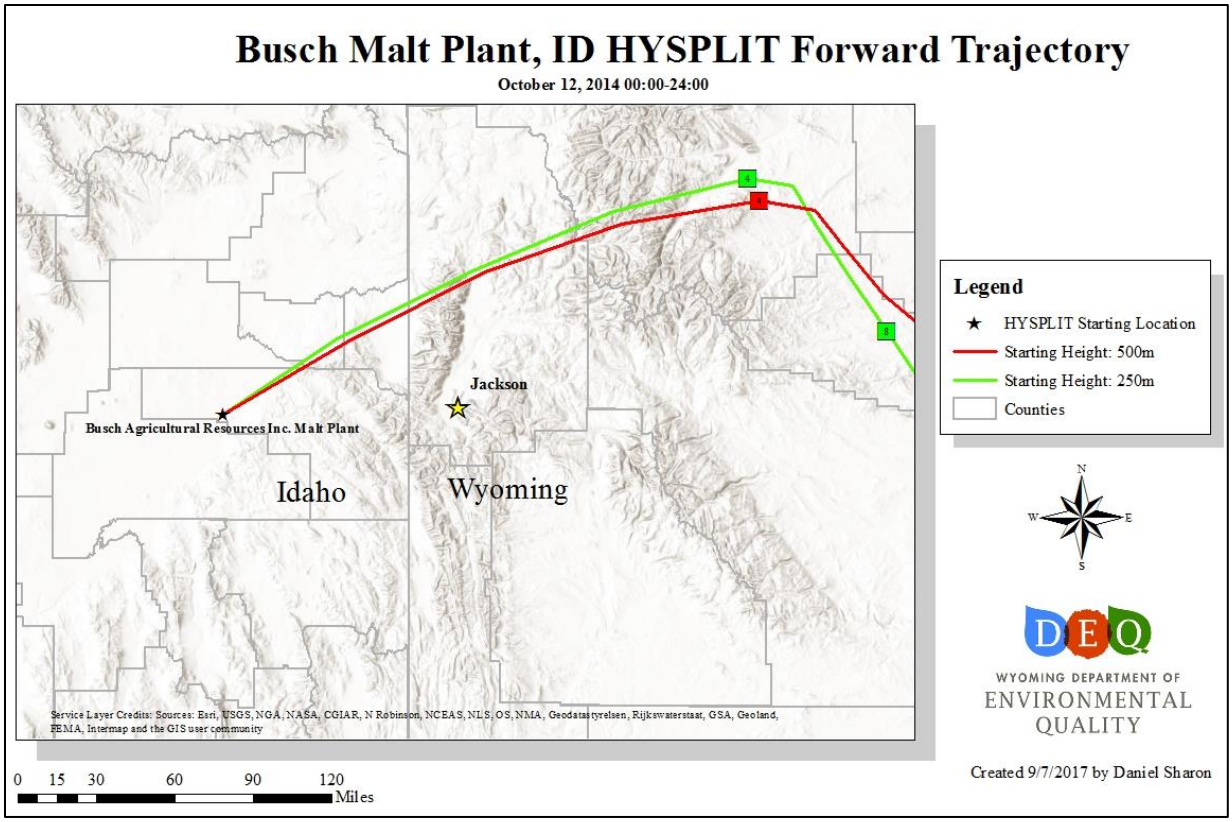


Figure 10. HYSPLIT Run 3 (Busch Agricultural Resources Inc. Malt Plant)

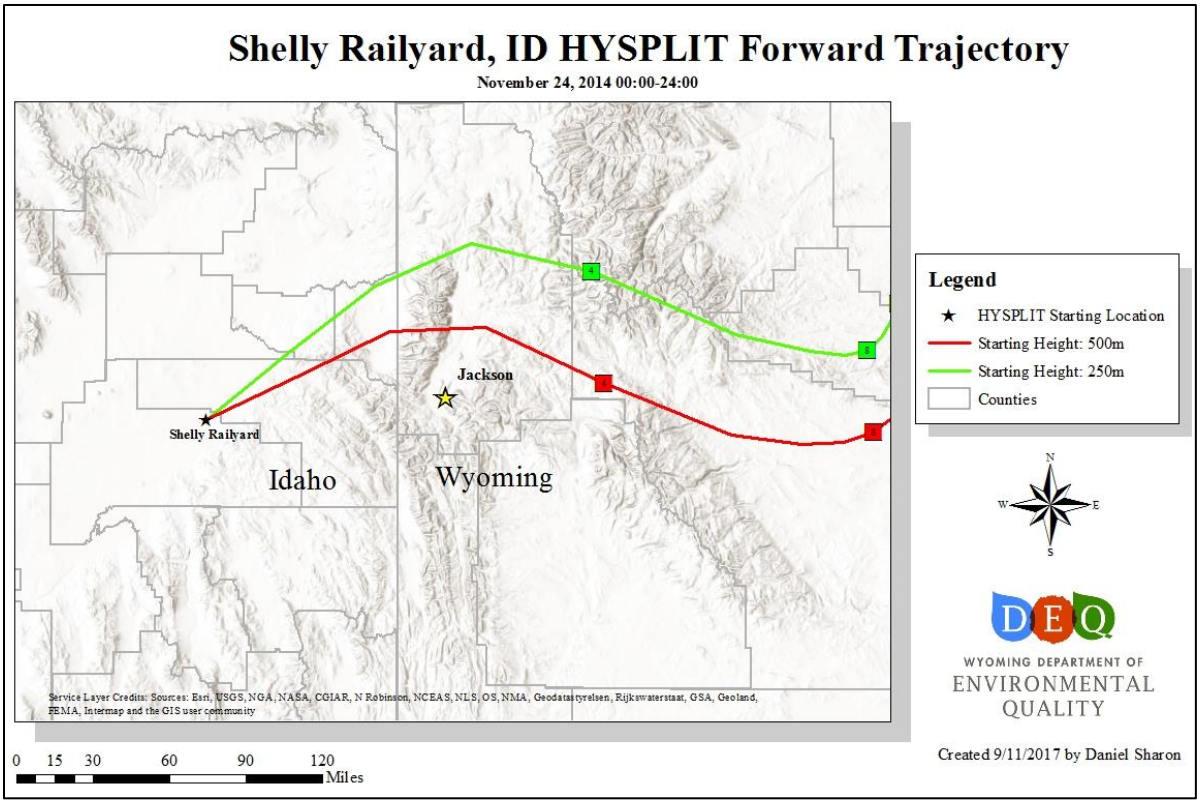


Figure 11. HYSPLIT Run 4 (Shelly Railyard)

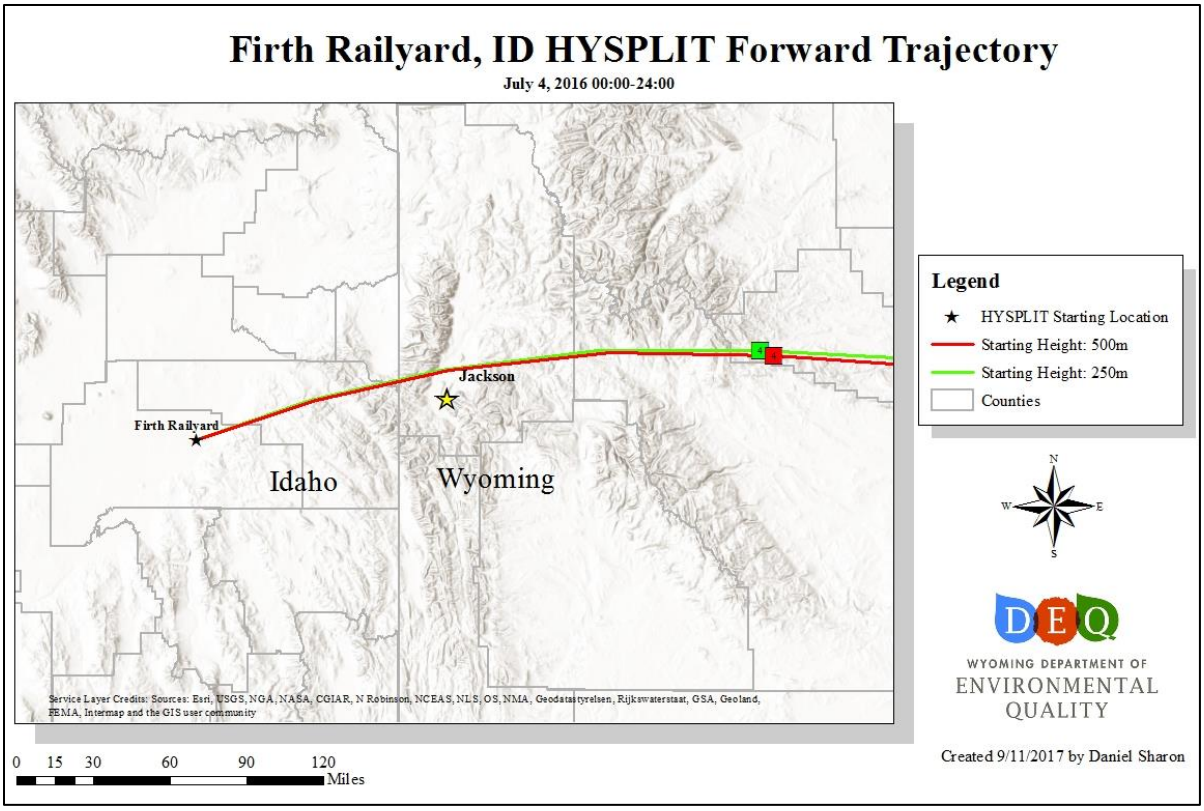


Figure 12. HYSPLIT Run 5 (Firth Railyard)

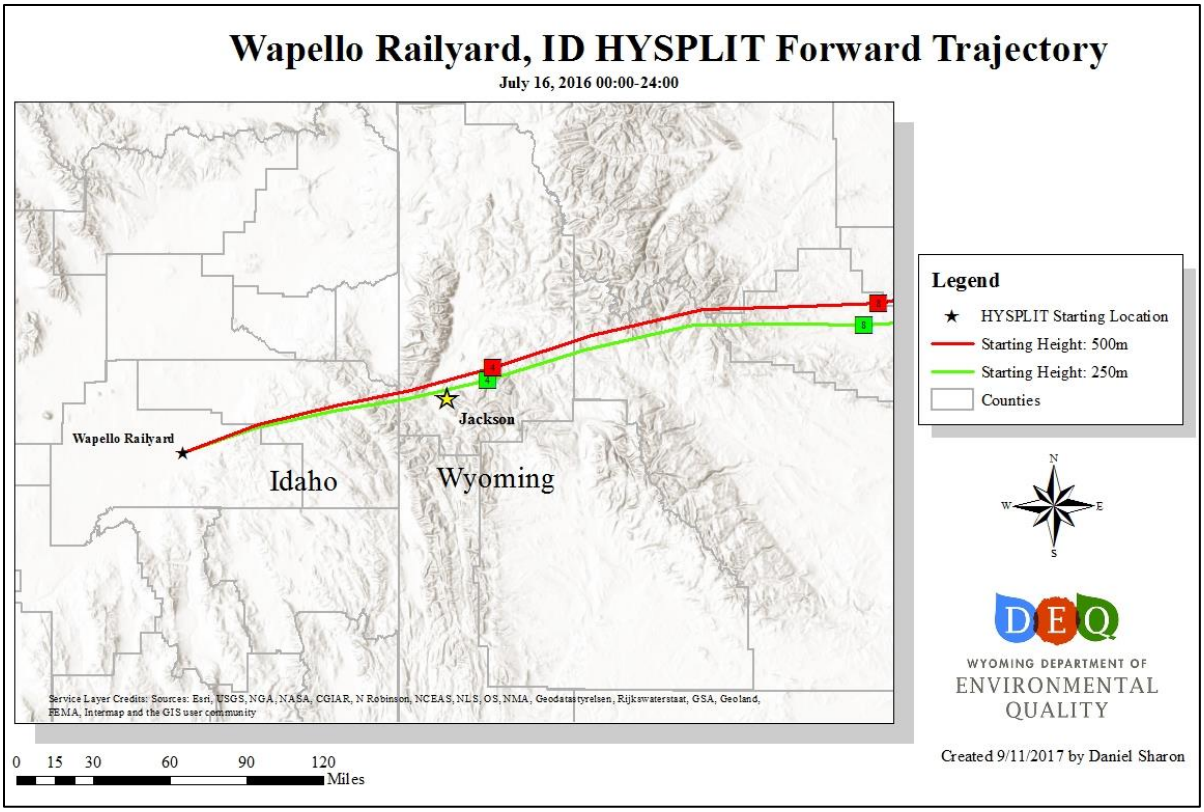


Figure 13. HYSPLIT Run 6 (Wapello Railyard)

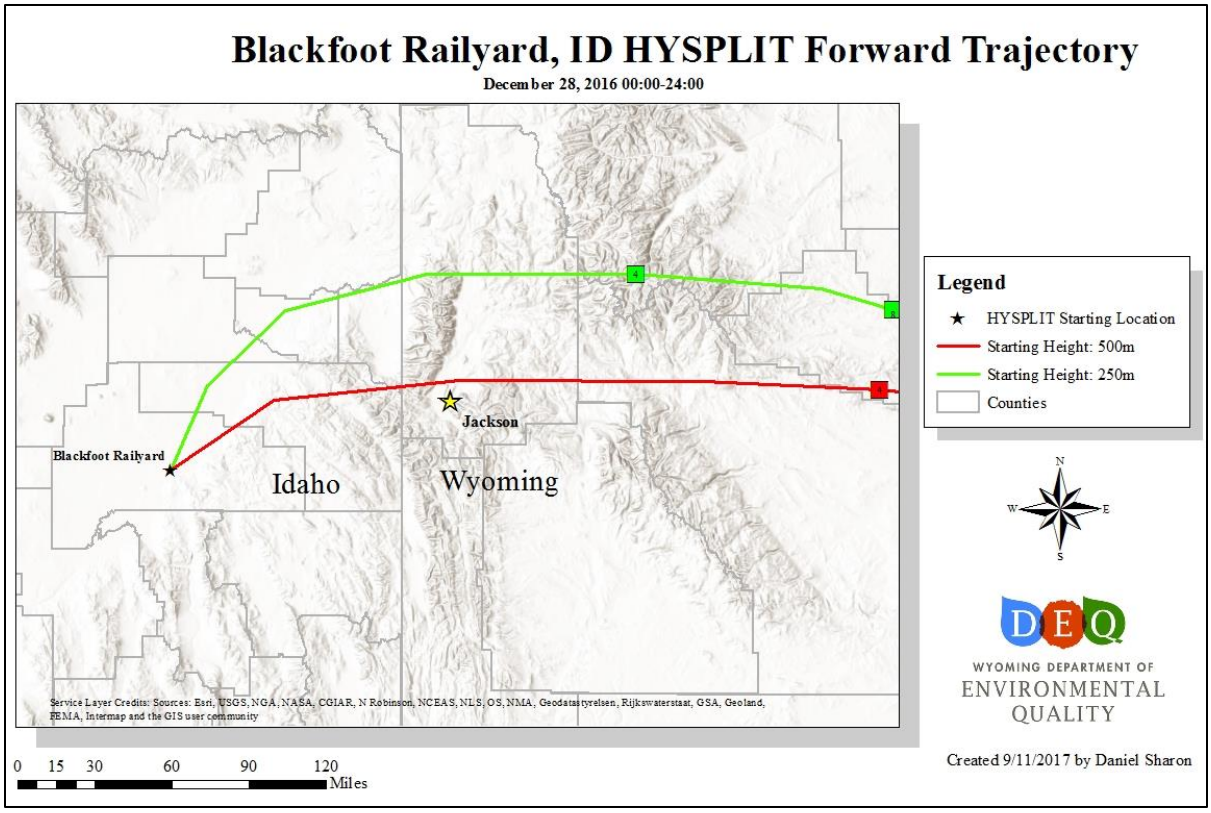


Figure 14. HYSPLIT Run 7 (Blackfoot Railyard)

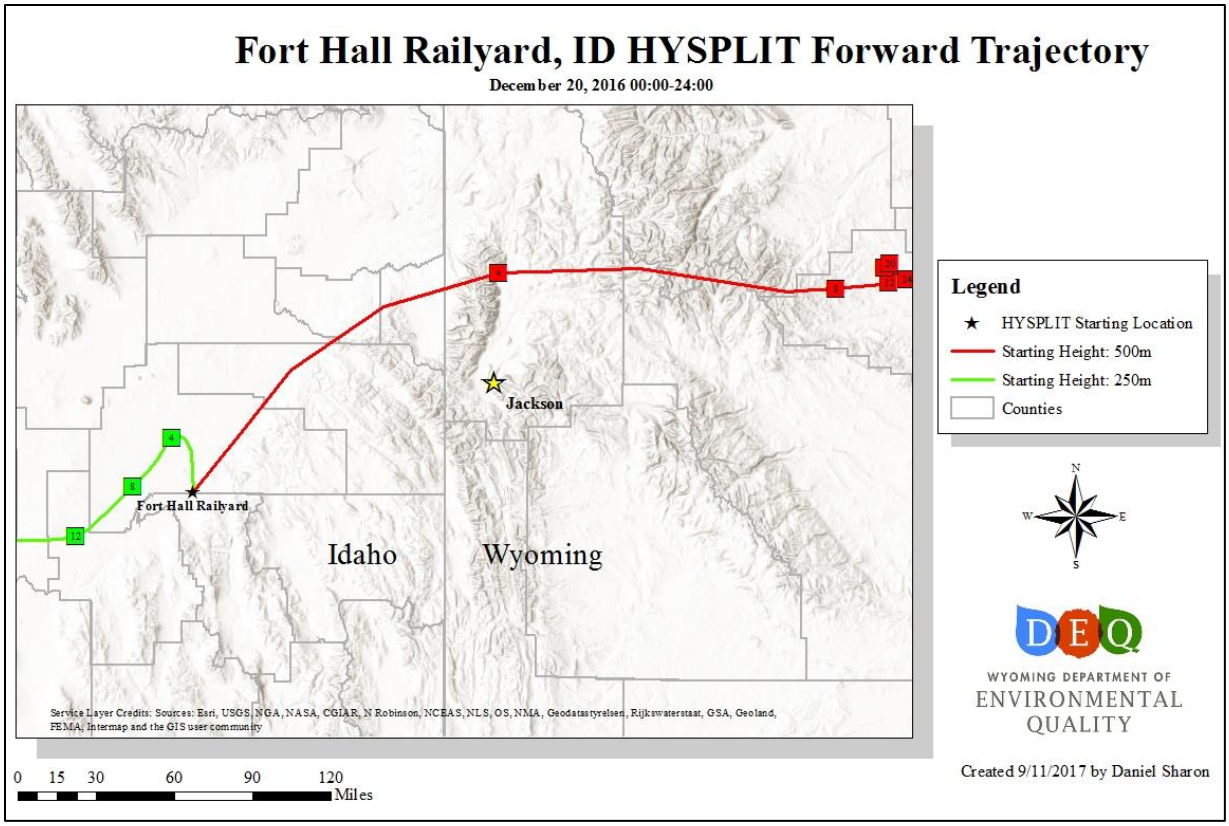


Figure 15. HYSPLIT Run 8 (Fort Hall Railyard)

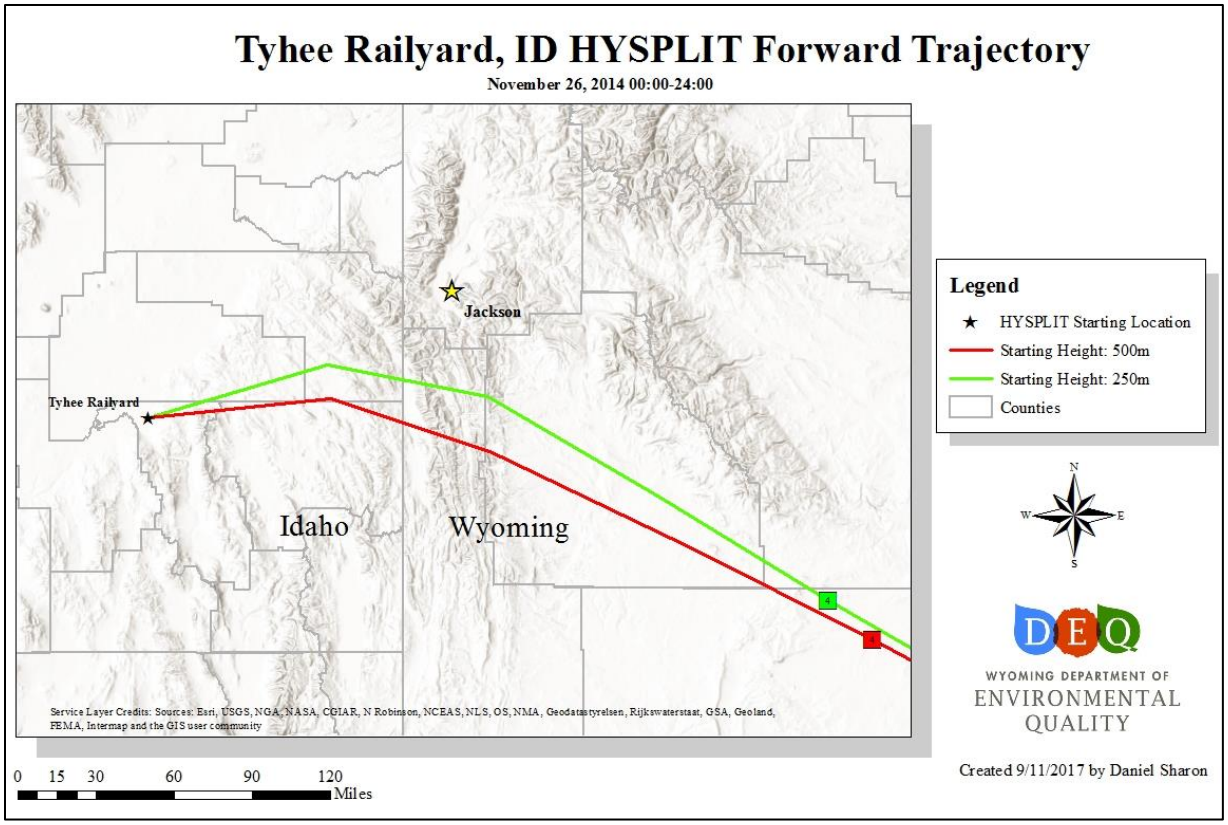


Figure 16. HYSPLIT Run 9 (Tyhee Railyard)

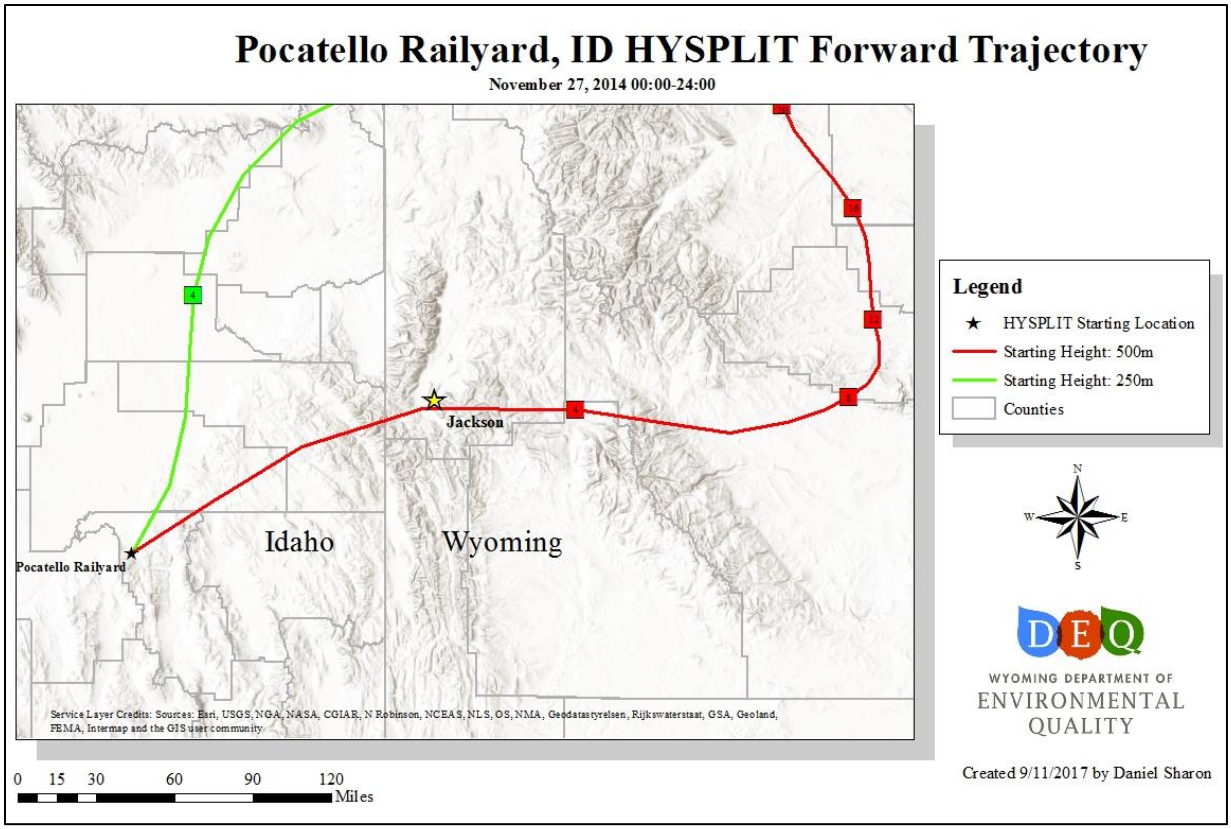


Figure 17. HYSPLIT Run 10 (Pocatello Railyard)

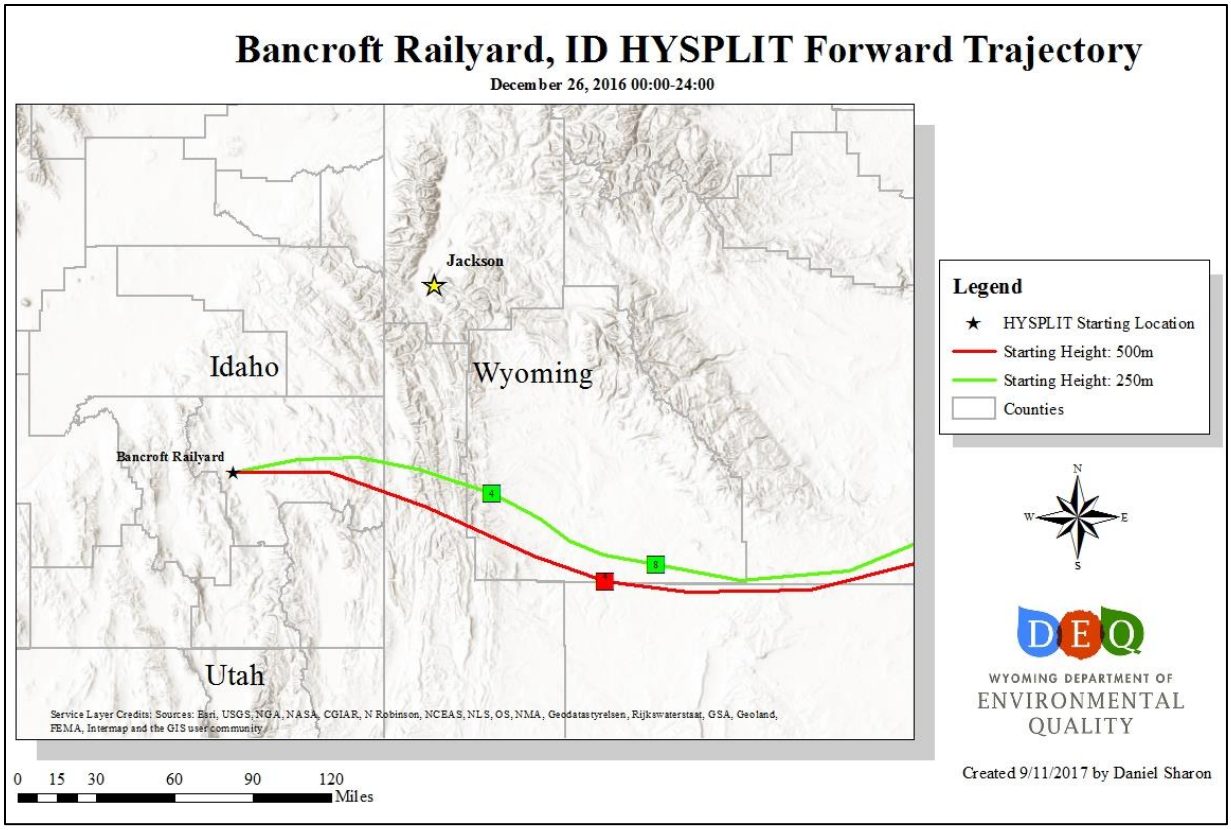


Figure 18. HYSPLIT Run 11 (Bancroft Railyard)

Based on these modeled trajectories, emissions from Idaho's Bonneville, Bingham, and Bannock Counties can reasonably be expected to impact air quality in Jackson under prevailing meteorological conditions. According to these Figures it appears that the Teton mountain range, running north-south to the northwest of Jackson, influences the movement of air masses in the area, with air parcels passing either to the north or south of the range.

VI. Summary and Conclusion

Winds in Jackson and along the Wyoming-Idaho border are predominantly out of the SW and SSW, while winds are most likely to occur out of the N and NE. Some of the largest emissions sources in Idaho for VOCs, NO_x, and SO_2 are located directly upwind of Jackson, Wyoming in Bonneville, Bingham, and Bannock Counties. Modeling analyses from these emissions sources demonstrate that under typical meteorological conditions air masses are reasonably expected to travel to, and influence air quality in Jackson, Wyoming.

This conclusion validates and enhances the finding in the AQD's Network Assessment that future gaseous monitoring is needed to characterize air quality in the city of Jackson, WY. The AQD plans to site a mobile monitoring station in or around the city of Jackson in early 2018.

Appendix G: Jim Bridger Power Plant SO_2 Shutdown Request

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

DEQ

Matthew H. Mead, Governor

Todd Parfitt, Director

April 16, 2018

Joshua Rickard
U.S. Environmental Protection Agency, Region VIII
1595 Wynkoop Street
Denver, CO 80202-1129

RE: Jim Bridger Power Plant SO_2 Shutdown Request

Dear Mr. Rickard,

The Wyoming Department of Environmental Quality (DEQ) Air Quality Division (AQD) is providing the enclosed items to the Environmental Protection Agency (EPA) Region VIII in support of a request to shut down the Jim Bridger Power Plant SO_2 monitor (Air Quality System (AQS) ID 56-037-0020) pursuant to 40 CFR 51.1203 (c) (3). The data for this monitor collected from 2013-2015 have been used in lieu of continuing monitoring at this facility from 2017-2019 under the Data Requirements Rule (DRR) to make an area designation for the 2010 National Ambient Air Quality Standard (NAAQS) for 1-hour SO_2.

On January 13, 2017, Wyoming Governor Matt Mead sent a Round 3 designation recommendation for the 2010 1-hour SO_2 NAAQS for the area surrounding the Jim Bridger Power Plant to Region VIII based on the SO_2 data collected from 2013-2015. On January 18, 2017, the AQD sent a letter and additional documentation to EPA Region VIII further supporting the use of the historical SO_2 data collected at this monitor for designation purposes. On January 9, 2018, the EPA published its final Round 3 designations for Wyoming in the Federal Register (Vol. 83, No. 6). All areas of Sweetwater County east of US Route 191, including the area surrounding the Jim Bridger Power Plant were designated as "Attainment/Unclassifiable".

Following this designation, the DEQ-AQD began discussing the possibility of shutting down the Jim Bridger SO_2 monitor with Region VIII. On a phone call with Region VIII on February 21, 2018, the Region indicated that such a shutdown request would need to satisfy the DRR monitor shutdown requirements in 40 CFR 51.1203 (c) (3). As such, the AQD would be required to submit and certify 2016 and 2017 data to AQS, complete a Network Modification Form, perform an analysis to demonstrate that the monitor was operated in a manner equivalent to a State and Local Ambient Monitoring Station (SLAMS), and perform an additional analysis pursuant to the DRR shutdown requirements in 40 CFR 50.1203.

Based on the guidance provided in the February 21, 2018 phone call, the 2016 and 2017 data were completely uploaded by the AQD in March 2018. The 2016 and 2017 data were certified by the facility in separate letters to EPA Region VIII in April 2018. The two analyses and the Network Modification

200 West 17th Street · Cheyenne, WY 82002 · http://deq.wyoming.gov · Fax (307)635-1784

ADMIN/OUTREACH (307) 777-7937 | ABANDONED MINES (307) 777-6145 | AIR QUALITY (307) 777-7391 | INDUSTRIAL SITING (307) 777-7369 | LAND QUALITY (307) 777-7756 | SOLID & HAZ. WASTE (307) 777-7752 | WATER QUALITY (307) 777-7781

Form were completed in April 2018 and are enclosed. After reviewing these data, the DEQ-AQD is confident that the quality of the data is sufficient to satisfy the quality assurance requirements of 40 CFR Part 58, Appendix A, and that this monitor has satisfied all regulatory requirements for shut down. The DEQ-AQD hereby requests that the Jim Bridger Power Plant SO_2 monitor be allowed to cease operations.

The AQD understands that the approval to shut down this monitor is contingent on an EPA Region VIII analysis of the data and supporting documentation provided, and that such approval will come in Region VIII's response to the AQD's 2018 Annual Monitoring Network Plan. As such, this letter and all supporting documentation will also be provided as an appendix to the 2018 Annual Monitoring Network Plan.

Please contact Monitoring Section Project Manager Daniel Sharon at daniel.sharon@wyo.gov or 307-777-7104 if you have questions concerning this matter or require additional information from the facility or the AQD.

Sincerely,

Cara Keslar
Monitoring Section Supervisor
Wyoming DEQ – Air Quality Division

Cc: Adam Clark, EPA Region VIII [without Encl.]
Albion Carlson, EPA Region VIII [without Encl.]
Nancy Vehr, AQD Administrator [without Encl.]
Amber Potts, AQD Planning Section Supervisor [without Encl.]
Daniel Sharon, AQD Monitoring Section Project Manager [without Encl.]
Thomas Wiscomb, PacifiCorp

Enclosures:
1. Network Modification Request Form
2. SLAMS-Like Analysis
3. Analysis pursuant to 40 CFR 50.1203 (c) (3)

State of Wyoming Ambient Air Monitoring Site Modification Form (Version 1, 12-2011)

DATE: 04/16/2018	CITY: Point of Rocks	STATE: Wyoming
AQS SITE ID: 56-037-0020	SITE NAME: Jim Bridger Sulfur Dioxide Station	

PROPOSED MODIFICATION/REASON WHY/SITE OBJECTIVE:

Shutdown the Jim Bridger SO2 DRR Monitor pursuant to 51.1203 (c)(3). The data for this station have been used for area designation purposes and the station has no other regulatory reason to continue monitoring.

AIR QUALITY PARAMETER (PM10, SO2, CO, NO2, ETC.)	MONITOR TYPE (NAMS, SLAMS, SPM, TRIBAL, etc.)	CHECK ONE OR MORE OF THE APPLICABLE CATEGORIES BELOW:				LIST SAMPLER EQUIPMENT
		MAX CONC	SOURCE IMPACT	POPULATION EXPOSURE	BACKGROUND	
SO2	Industrial (DRR)	✓				T-API 100E

PROPOSED SAMPLING START OR REMOVAL DATE OR DATE STARTED OR REMOVED: Will be removed upon EPA approval (~fall/winter 2018)

ESTIMATED MEASUREMENTS FOR AIR QUALITY PARAMETERS:

LOCATION (LAT./LONG. OR UTM=S): 41.7464916,-108.80373

SITE ELEVATION (M. MSL): 2045				PROBE HEIGHT (M. AGL): 4.0	
DISTANCE TO TREE DRIPLINE (M)	DIRECTION TO TREE	DISTANCE TO OBSTACLE (M)	DIRECTION TO OBSTACLE	OBSTACLE HEIGHT ABOVE PROBE (M)	OBSTACLE COMMENTS
N/A					

UNRESTRICTED AIR FLOW:	✓ >270 DEG.	☐ >180 DEG.	<CRITERIA_____DEG.
DISTANCE TO INTERSECTIONS (M): 1 mile to private road		DISTANCE FROM SUPPORTING STRUCTURES (M): VERT. N/A HORIZ. N/A	

DISTANCE TO EDGE OF NEAREST ROADWAY	NAME OF ROADWAY	DIRECTION	DAILY TRAFFIC ESTIMATES	YEAR OF TRAFFIC ESTIMATES	TYPE OF ROADWAY	COMMENTS
45+ miles	Co. Rd.	NORTH	unknown	unknown	unimproved	
1 mile	Co. Rd. 15	EAST	150	54750	semi-private	Industry traffic
4.3 miles	I-80	SOUTH	1121	409165	Interstate	Behind Mountain
7.7 miles	WY-371	WEST	300	109500	State Route	Behind Mountain

DISTANCE TO NEAREST POINT SOURCES (MILES)	DIRECTION TO POINT SOURCES	DISTANCE TO NEAREST AREA SOURCES (MILES)	DIRECTION TO AREA SOURCES	COMMENTS
1.5 miles	ESE	1.5 miles	ESE	JB Power Plant

CERTIFICATION: I certify the network modification proposed above meets all 40 CFR 58, Appendix E siting criteria, except as noted with submittal.

Printed Name: Daniel Maurice Sharon Signature: [signature]

FOR EPA USE ONLY: Received Date:_____ Follow-up Actions:_____ Approval Status Given:_____ Email Response Date:_____ Letter Response Date:_____

FOR METEOROLOGICAL PARAMETERS ONLY:

MONITORING PURPOSE/OBJECTIVES:
N/A

PROPOSED MONITORING SCHEDULE/DURATION:

PROPOSED START/REMOVAL DATE OR DATE STARTED/REMOVED:

DATA ACQUISITION SYSTEM:

PRIMARY:	PARAMETERS:	APPLICABLE √ those that apply	SENSOR HT (M)
BACKUP	WINDSPEED/DIRECTION		
EQUIPMENT MANUFACTURER/MODEL:	SOLAR RADIATION		
	RELATIVE HUMIDITY		
WILL THE DATA BE USED FOR MODELING? YES ◯ NO ◯	PRESSURE		
IS SITE REQUIRED FOR SIP? YES ◯ NO ◯	SIGMA THETA		
UNRESTRICTED AIRFLOW? YES ◯ NO ◯	PRECIPITATION		
DISTANCE TO TREE DRIPLINE (M)	TEMPERATURE		
NEARBY TERRAIN: SMOOTH ROLLING ROUGH	OTHER (DESCRIBE)		

TOPOGRAPHIC FEATURES (E.G HILLS, MOUNTAINS, VALLEYS, RIDGES, BODIES OF WATER):

COMMENTS:

Enclosure 2

Analysis- SLAMS equivalency for the Jim Bridger Power Plant SO_2 DRR monitor

April 16, 2018

The following analysis is being provided based on guidance provided by Environmental Protection Agency (EPA) Region VIII in a February 21, 2018 phone call, in which it was indicated that the Wyoming Department of Environmental Quality (DEQ) Air Quality Division (AQD) should demonstrate that the Jim Bridger Power Plant SO_2 monitor (Air Quality System (AQS) ID 56-037-0020) has been operated in a manner equivalent to a State and Local Ambient Monitoring Station (SLAMS).

Background

The Jim Bridger Power Plant SO_2 monitor was installed on a voluntary basis by the facility in late 2011 and began collecting data on January 5, 2012. In 2016, the monitor was approved by the AQD and EPA Region VIII for the purposes of satisfying the Data Requirements Rule (DRR) for the 2010 National Ambient Air Quality Standard (NAAQS) for 1-hour SO_2 under the monitoring pathway. Data for this monitor were reported to AQS starting on January 1, 2017 pursuant to the requirements of the DRR, and previous data (2013-2015, and subsequently 2016) were later uploaded in order to make area designations under the 2010 NAAQS and support potential monitor shut down, respectively.

Siting

The site was previously approved by the AQD on November 8, 2011 as sufficient in demonstrating compliance with the one-hour SO_2 NAAQS. A Site Modification Form was completed by the facility and submitted to the AQD. This site was approved by the AQD and EPA Region VIII for the purpose of fulfilling SO_2 monitoring requirements under the Data Requirements Rule for the 2010 NAAQS for 1-hr SO_2 through a March 2016 siting trip and the Region VIII approval of the site in the AQD's 2016 Network Plan. Based on the 2011 and 2016 siting approvals by the AQD and EPA Region VIII, this monitor meets all applicable siting criteria in 40 CFR 58 Appendix E.

Instrumentation

The instrument that has been operating at this station since its start date in January 5, 2012 is a Teledyne Advanced Pollution Instrumentation (API) Model 100e SO_2 analyzer (EPA Reference Method Number EQSA-0495-100). This instrument has been approved by the EPA for collecting SLAMS-like measurements of SO_2.

Completeness

Generally, in order to compare 1-hour SO_2 data to the 2010 NAAQS, data must have data completeness of at least 75% per quarter according to 40 CFR 50 Appendix T section 3 (b). Per the quarterly reports submitted by the facility and AMP430 Data Completeness AQS Reports pulled for the monitoring years 2013-2017, the Jim Bridger SO_2 analyzer has met this data completeness requirement for all years of data

that have been reported to AQS. All quarters had data completeness greater than 90%. Data completeness for this monitor is summarized by quarter and year in Table 1, below.

Year	Quarter				Annual
	Q1	Q2	Q3	Q4	
2013	94%	98.5%	98.5%	93.4%	96%
2014	95.8%	98.2%	98.5%	97.4%	97%
2015	98.5%	98.5%	98.5%	98.5%	98%
2016	98.3%	97.3%	97.6%	90.3%	96%
2017	99.3%	98.3%	96.6%	99.6%	98%

Table 1. Jim Bridger Power Plant SO_2 monitor data completeness

Quality Assurance Project Plan/Quality Management Plan

The Jim Bridger Power Plant SO_2 monitor has operated according to the requirements of a project-specific Quality Assurance Project Plan (QAPP) since 2012. The original QAPP was reviewed and found complete and sufficient by the AQD in August 2012 but was not formally approved by the AQD due to the voluntary nature of the monitor until the 2013-2015 data were being considered by EPA Region VIII for use in the Round 3 designations under the 2010 SO_2 NAAQS. The facility updated the QAPP to incorporate elements of a Quality Management Plan (QMP) in October 2016 to align with the new applicability of 40 CFR 58 Appendix A to industrial monitors and the proposed use of the monitor at that time to be used under the monitoring pathway of the DRR. The AQD approved a draft of the QMP-QAPP document in January 2017, however due to new direction received from Region VIII on March 8, 2017 that the Region would need to formally approve all industrial QMP-QAPP documents, the Jim Bridger Power Plant SO_2 QMP-QAPP has not yet been approved to date.

Annual Data Certification

In accordance with 40 CFR 58.15, the data for this monitor reported to AQS from 2013-2017 have been certified by the PQAO (PacifiCorp, WY, PQAO number 1348). 2013-2015 data were certified by the facility in December 2016 in a joint package to EPA Region VIII. The facility certified 2016 and 2017 data in separate packages to Region VIII in April 2018.

Adherence to QA/QC Requirements

Based on its review of the Jim Bridger Power Plant SO_2 monitor's quarterly report and data submittals, the AQD is confident that this monitor followed the Quality Assurance/Quality Control (QA/QC) requirements outlined in 40 CFR 58 Appendix A, the QA Handbook Volume II, and the various project-specific QAPP/QMP-QAPP documents to such a degree that the monitor could be said to have operated in a SLAMS-equivalent manner. A brief analysis of this monitor's adherence to the major regulatory requirements and guidelines is included below, though this by no means comprises a comprehensive list of all of the QA/QC activities performed on this monitor.

One-point QC Checks (1 every 2 weeks, < +/-10.1% difference or < +/-1.5 ppb)

One-point QC checks were typically performed every 3 days at this monitor. The target of these checks were performed at 90 ppb from 2013 to September 2016 when the checks were lowered to 80 ppb to align with the revision of 40 CFR 58 Appendix A in April 2016. These checks were typically good and

because they were performed more frequently than required by the facility, the analyzer was able to be calibrated often to keep it from drifting out of compliance.

Zero/Span Check (1 every 2 weeks, Zero drift < +/-3.1 ppb (24-hr), < +/-3.1 ppb (>24-hr), Span drift < +/-10.1%)
Zero and Span checks were typically performed every 3 days at this monitor. The zero acceptance criteria used for this project was +/-3% of full scale (12 ppb) per the project QAPP. This aligns with the January 2017 revision to the QA Handbook Volume II, but not the May 2013 version of this document, which had a tighter range for zero drift of +/-1.5 ppb. Even so, given that checks were performed more frequently than required by the facility, zero drift was almost always within +/-1.5 ppb prior to 2017. Span checks were all within the criteria specified by the QA Handbook Volume II.

Annual Performance Evaluations (1 every year)
The facility's air monitoring contractor conducted quarterly performance audits of the SO_2 analyzer from 2013 to Q2 2016 when audits were shifted to being performed twice a year. The audit levels were also changed as of the September 2016 audit to better align with the lower audit levels included in the April 2016 revisions of 40 CFR 58 Appendix A. All of these audits passed. The individual who conducted the audits was not directly involved with any other aspect of this monitoring project.

National Performance Audit Program (1 per year for a network of a single site)
A passing National Performance Audit Program (NPAP) audit was performed on March 20, 2017. These audits became a requirement for industrial monitors with the revisions to 40 CFR Part 58 Appendix A in April 2016, therefore this monitor was not held strictly to this requirement until data were explicitly required to be reported to AQS starting on January 1, 2017 as part of the monitor's use in designations under the monitoring pathway of the DRR.

Technical Systems Audit (1 every 3 years per PQAO)
A Technical Systems Audit (TSA) has not been performed at this site by EPA Region VIII to date. These audits became a requirement for industrial monitors with the revisions to 40 CFR Part 58 Appendix A in April 2016, therefore this monitor was not held strictly to this requirement until data were explicitly required to be reported to AQS starting on January 1, 2017 as part of the monitor's use in designations under the monitoring pathway of the DRR.

Verification/Calibration (1 every 6 months, all points < +/-2% or < +/-1.5 ppb of best-fit line)
This monitor was calibrated every 3 months. Individual points were occasionally outside of these criteria during the "as found" verification, but were typically corrected immediately with an "as left" calibration.

Shelter Temperature Range (20-30° C or manufacturer's recommendations)
The facility used the range 5-40° C for this project, consistent with the manufacturer's recommendations. There were occasional instances of the shelter temperature falling outside of this range. In these cases, data for the affected period were invalidated using an "AE" code.

Enclosure 3

Analysis pursuant to 40 CFR 51.1203 (c) (3) for the shutdown of the Jim Bridger Power Plant SO_2 DRR monitor

April 16, 2018

40 CFR 51.1203 contains air agency requirements to satisfy the Data Requirements Rule (DRR) for the implementation of the 2010 SO_2 National Ambient Air Quality Standard (NAAQS). Subsection (c) of this part describes requirements for the monitoring "pathway" under the DRR, subsection (3) of which describes the requirements for shutting down a DRR monitor. The language in 40 CFR 51.1203 (c) (3) is quoted below:

> *"Any SO_2 monitor identified by an air agency in its approved Annual Monitoring Network Plan as having the purpose of meeting the requirements of this paragraph (c) that: Is not located in an area designated as nonattainment as the 2010 SO_2 NAAQS is not also being used to satisfy other ambient SO_2 minimum monitoring requirements listed in 40 CFR part 58, appendix D, section 4.4; and is not otherwise required as part of a SIP, permit, attainment plan or maintenance plan, may be eligible for shut down upon EPA approval if it produces a design value no greater than 50 percent of the 2010 SO_2 NAAQS from data collected in either its first or second 3-year period of operation. The air agency must receive EPA Regional Administrator approval of a request to cease operation of the monitor as part of the EPA's action on the Annual Monitoring Network Plan under 40 CFR 58.10 prior to shutting down any qualifying monitor under this paragraph (c)."*

The following is a comparison of the Jim Bridger Power Plant SO_2 monitor (Air Quality System (AQS) ID 56-037-0020) to each of the requirements in 40 CFR 51.1203 (c) (3).

a. ***"…is not located in an area designated as nonattainment…"***
The area of Sweetwater County surrounding the Jim Bridger Power Plant was classified, in 40 CFR 81.351, as being Better than National Standards under all previous SO_2 NAAQS and was designated as "Attainment/Unclassifiable" under the 2010 1-Hour SO_2 NAAQS on January 9, 2018.

b. ***"…is not also being used to satisfy other ambient SO_2 minimum monitoring requirements listed in 40 CFR part 58, appendix D, section 4.4…"***
The only SO_2 monitor in the State of Wyoming that is specifically required by 40 CFR part 58, Appendix D, section 4.4 is the SO_2 monitor at the Cheyenne, WY NCore monitoring station, per section 4.4.5 of Appendix D. The Jim Bridger Power Plant SO_2 monitor is not specifically required by any of the minimum monitoring requirements found in 40 CFR 58, App. D, 4.4.

c. ***"…is not otherwise required as part of a SIP, permit, attainment plan or maintenance plan…"***

The Jim Bridger Power Plant SO_2 monitor is operated for the sole purpose of satisfying the DRR and is not otherwise required as part of a State of Wyoming State Implementation Plan (SIP), Jim Bridger Power Plant NSR or Title V permit, attainment plan or maintenance plan.

d. ***"…may be eligible for shut down upon EPA approval if it produces a design value no greater than 50 percent of the 2010 SO2 NAAQS from data collected in either its first or second 3-year period of operation…"***
Table 1 below summarizes the 1-year and 3-year design values for this monitor from the monitoring period of 2013 to 2017.

Design Value Year	Maximum Value (ppb)	99th Percentile (ppb)	3-Year DV Period	3-Year Design Value (ppb)	% of NAAQS
2013	79	29	N/A	N/A	N/A
2014	56	32	N/A	N/A	N/A
2015	73	31	2013-2015	**31**	**41.3%**
2016	98	35	2014-2016	**33**	**44%**
2017	38	16	2015-2017	**27**	**36%**

Table 1. Design Value Summary for the 2010 1-hour SO_2 Standard

The 2013-2015, 2014-2016, and 2015-2017 3-year design values are all below 50% of the 2010 SO_2 NAAQS of 75 ppb (50% of which is 37.5 ppb).

e. ***"…The air agency must receive EPA Regional Administrator approval of a request to cease operation of the monitor as part of the EPA's action on the Annual Monitoring Network Plan under 40 CFR 58.10 prior to shutting down any qualifying monitor under this paragraph (c)"***
The State of Wyoming Air Quality Division (AQD) plans to include this analysis and other supporting documentation as an appendix to the 2018 Annual Monitoring Network Plan and will not authorize Jim Bridger Power Plant to shut down the SO_2 monitor until EPA Region VIII approval is received as part of its action on the Network Plan.

Based on the summary above, the Jim Bridger Power Plant SO_2 monitor qualifies for monitor shut-down under 40 CFR 51.1203 (c) (3), contingent on the concurrent approval of the other supporting information provided in the 2018 Annual Monitoring Network Plan.